A New Food Diplomacy:

Participatory Action Research Findings

of a Food System Approach to Public Health Nutrition

AMBER ARMSTRONG ASKEW WHEELER

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Swyddfa Ymchwil Graddedigion

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Abstract

This thesis begins by problematising divergence in the food system. It then asks whether greater convergence can facilitate better public health nutrition and positive food system change. It starts by combining production and place of consumption in the form of calculating the Welsh and UK population's fruit and vegetable requirement. It explains that the requirement was shared with 178 stakeholders; mainly producers and support organisations in Wales, who took part in 39 semi-structured interviews and 12 workshops. The in-depth discussion of barriers and enablers to fruit and vegetable production and consumption that this stimulated is discussed in detail. One of the barriers outlined is a need for a more systemic approach and for a broader range of food system stakeholders to be involved. The researcher's involvement, through Participatory Action Research, with the development of Peas Please, an initiative advocating a systemic approach to increasing vegetable consumption in the UK, is then discussed. The activities and food system approach of Peas Please are reflected upon, including the importance of building relationships. The thesis finds that convergence has potential to deliver positive systemic change, and through Peas Please and the use of the fruit and vegetable requirement stakeholders from different paradigms have come together to experiment within this 'space of possibility'. The analysis suggests however, that the complexities of the food system and the divergences between actors mean that, in practice, to make 'spaces of possibility' work entails using mediation and other skills, amounting to a new food diplomacy. In conclusion, the thesis proposes that, in order to facilitate positive food system change to achieve better public health nutrition, a new food diplomacy should be recognised, supported and taught.

For Henry

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Anacronyms

AHDB	Agriculture and Horticulture Development Board
CALU	Centre for Alternative Land Use
CAP	Common Agricultural Policy
CLA	The Country Land and Business Association
CLAS	Community Land Advisory Service, Wales
CSA	Community Supported Agriculture
CSO	Civil Society Organisation
EU	European Union
FACE	Farming and Countryside Education
FUW	The Farmers' Union of Wales
GMO	Genetically Modified Organism
IAASTD	International Assessment of Agricultural Knowledge, Science, and Technology for Development
NFU	National Farmers Union
NFU Cymru	National Farmers Union Wales
NGO	Non-Governmental Organisation
NPS	National Procurement Service
NVS	The National Vegetable Society
OCW	Organic Centre Wales
PAR	Participatory Action Research
PHE	Public Health England
PLANED	Pembrokeshire Local Action Network for Enterprise and Development
US	United States
USA	United States of America
UK	United Kingdom
WHO	World Health Organisation
YFC	Young Farmers Club

Abbreviations

g	Grammes
ha	Hectares
Mt	Million metric tonnes (1,000,000t)
pa	Per annum
t	Metric tonne
t/ha	Metric tonnes per hectare
tpa	Metric tonnes per annum

Shortened names used in this thesis

‘City Farms’	Federation of City Farms and Community Gardens, Wales

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The Road Not Taken

TWO roads diverged in a yellow wood,
And sorry I could not travel both
And be one traveler, long I stood
And looked down one as far as I could
To where it bent in the undergrowth;

Then took the other, as just as fair,
And having perhaps the better claim,
Because it was grassy and wanted wear;
Though as for that the passing there
Had worn them really about the same,

And both that morning equally lay
In leaves no step had trodden black.
Oh, I kept the first for another day!
Yet knowing how way leads on to way,
I doubted if I should ever come back.

I shall be telling this with a sigh
Somewhere ages and ages hence:
Two roads diverged in a wood, and I –
I took the one less traveled by,
And that has made all the difference.

Robert Frost (1920)

1 Introduction

Each year, at the beginning of January in Oxford, two farming conferences take place at exactly the same time at opposite ends of the High Street: The Oxford Farming Conference and the Oxford Real Farming Conference. They symbolise two paths the food system has taken. Participants at the Oxford Farming Conference tend to be involved in the industrial 'mainstream' food system. Their proposed solutions to the problems of 'how to feed the world' revolve around large-scale production, big business, sustainable intensification, genetic modification, biotechnology and robotics. The Oxford Real Farming Conference has evolved in opposition to the Oxford Farming Conference and the industrial food and farming system it represents. Participants at the Oxford Real Farming Conference tend to be involved in what has become known as the 'alternative' food system. They tend to believe that the answer to the problems of the food system is an 'agrarian renaissance' (Tudge, 2011) and an increase in the availability of quality foods provided by smaller-scale producers and retailers (Guthman, 2011). Of course, these are sweeping generalisations and the situation is more complicated and nuanced[1], but this thesis asks, given the problems now faced by the food system, whether divergence in the food system is holding back some of the changes required to allow it to deliver greater sustainability and food security. It explores whether a more convergent approach could facilitate better public health nutrition and broader sustainability.

In her 1962 book 'Silent Spring' Rachel Carson examined the rise and consequences of industrial farming, and particularly the use of pesticides, predicting widespread environmental degradation and biodiversity loss. She used the metaphor of the divergent paths in Frost's (1920) poem 'The Road Not Taken' to call for the food and farming system to take another path. Carson's work is considered to have been among the catalysts for the following environmental movement, but in the main, the food and farming system has carried on along its original path. Fifty years after 'Silent Spring' was written, Carson's predictions of widespread biodiversity loss and environmental degradation have come true (Millenium Ecosystem Assessment, 2005). Although the modern food system has, some argue, enabled population

[1] Discussed in more depth in Chapter 2 (Literature Review) and Chapter 7 (Discussion)

growth and contributed to the reduction in the number of undernourished people, other commentators point out that as it has spread across the world, and because of its tendency to generate calorie-rich, highly processed, nutritionally poor food, it is the cause of a global increase in malnutrition and obesity, and a correlated rise in non-communicable disease (Haddad *et al.*, 2016). Despite there being enough food for everybody to eat, the modern food system has also failed to solve the problems of food insecurity, and is implicated in increasing inequality and food poverty (Patel, 2007).

The problems of the modern food system have been explored at length by academics, policy makers, and activists. The introductory chapter briefly outlines the issues in order to set the context, and then gives a description of the research for this thesis in the form of a chapter summary.

Following the financial crisis of 2007–2008, which resulted in political and economic instability, dramatic world food price rises, and food riots in Africa and the Middle East, there were many policy papers, academic and governmental, with a broad consensus that the food system was in crisis and needed to change: ‘business as usual is not an option’ (Ambler-Edwards *et al.*, 2009, Beddington *et al.*, 2011, FAO, 2009, Godfray, 2010, IAASTD, 2009, Royal Society, 2009, Environment Food and Rural Affairs Committee, 2009). These papers acknowledged that there were fundamental issues that needed to be addressed in order for the food system to be sustainable and to deliver food security for all into the future. The fundamental issues are known by some as the ‘new fundamentals’ (Lang, 2010, Ambler-Edwards *et al.*, 2009). In summary, these are population growth, the nutrition transition, the pressures of resource depletion (fossil fuels, land, water), inequality, labour shortages, climate change, biodiversity loss, and ecological degradation.

Population growth is slowing, but it is estimated that the population of the world will increase to around 9 billion by 2050 and then stabilise at around 11 billion by approximately 2100 (FAO, 2017). Most of the population rises will be in Africa and Asia which will see their populations rise by around 1 billion each by 2050 (Rosling *et al.*, 2018). It is also anticipated that two thirds of the world population will live in urban areas by 2050 (FAO, 2017) and this has implications for food production; in both the supply of cities from the outside and the potential for increased urban food

production. It also has implications for consumption, as “urban contexts are more vulnerable to food and lifestyle choices that prioritize the intake of prepared food and food away from home, foods that can be energy-dense and micronutrient-sparse” (Haddad *et al.*, 2016, p.77). Urbanisation across the world is also leading to a loss of agricultural labour in rural areas; which is in turn putting greater pressure on production systems: “As people move to urban areas and consume a greater and more varied diet they also become reliant on the correspondingly reduced rural population to produce their food and other agricultural commodities” (Ambler-Edwards *et al.*, 2009, p.17).

This increase in population is happening at the same time as resources are depleting; in terms of land, for instance, the “rise in global population means that the area of cultivated agricultural land per capita declined worldwide from 1.45 hectares in 1960 to just 0.78 hectares in 2003” (Ambler-Edwards *et al.*, 2009, p.15). The nutrition transition, explored in more detail in Chapter 2 (Literature Review), is putting additional pressure on the system as people with rising income increase consumption of resource-intensive forms of food such as meat and dairy products (Popkin, Adair and Ng, 2012). It is also leading to a rise in non-communicable diseases associated with being overweight that disproportionately affects those on lower incomes (Patel, 2007). The result of increased population and demands of population has meant that, according to the Millennium Eco-system Assessment (2005, p.16):

> “Over the past 50 years, during which time the human population doubled … humans have changed ecosystems more rapidly and extensively than in any other time in human history, mainly to meet rapidly growing demands for food, fresh water, timber, fiber, and fuel. This has resulted in a substantial and largely irreversible loss in the diversity of life on Earth.”

The Millennium Eco-system Assessment estimates that approximately 60% of ecosystem services have been degraded or used unsustainably. These include capture fisheries, water supply, waste treatment and detoxification, water purification, natural hazard protection, regulation of air quality, regulation of regional and local climate, regulation of erosion, and services related to spiritual fulfilment and aesthetic enjoyment. In other words, many services may have suffered as a result of the drive for food production over the last 50 years.

Rockström (2009) introduced the concept of planetary boundaries within which we expect that humanity can operate safely. An updated analysis by Steffen *et al.* (2015) shows that humans might be operating outside the safe space in terms of biosphere integrity, biogeochemical flows, land-system change and climate change (atmospheric CO_2). Climate change, in terms of rising temperatures, water shortages and an increasing number of natural disasters, is particularly going to affect food production and distribution across the world (IPCC, 2018).

The 'new fundamentals' represent a wide acknowledgement that 'business as usual' is not an option; and importantly, a broad consensus that there is a need to examine different approaches. This thesis takes its starting point as the divergent paths of the 'mainstream' and 'alternative' food system. It goes on to examine whether a degree of convergence between paths could offer a way forward in addressing some of the fundamental challenges of the modern food system. In particular, through the prism of seeking specific change in the form of increasing consumption of fruit and vegetables, it considers whether a more convergent path could lead to positive food system change in terms of improved public health nutrition. To go back to the Oxford farming conferences, it explores what might be achievable if participants at either end of the High Street were to meet in the middle.

1.1 Chapter summary

Chapter 2 (Literature Review) gives a brief history of the development of the modern food system. It links this to the food security narrative and to productionism and neoliberalisation. It then explores suggested solutions often expressed as alternative to the dominant neo-productionist food security approach, such as food sovereignty, the right to food, the livelihood approach, community food security and sustainable diets. The concept of an 'alternative' and 'mainstream' divide is explored. A broad range of theoretical tools are introduced to conceptualise convergence and system change; amongst these ecological public health, food system approaches and political ecology. It is suggested that combining public health nutrition and agri-food research might be a useful starting point and that one way in which this could be done would be by linking production to consumption of place. The rationale for adopting a convergent systemic approach is given. The reason for starting with

Wales and fruit and vegetables to link consumption and production of place is outlined. Finally, the specific research questions of the thesis are then summarised.

Chapter 3 (Methodology) outlines the main chosen research method, Participatory Action Research (PAR) and in particular Solidarity Action Research. The benefits and drawbacks of the PAR approach are expanded upon. The benefits of utilising mixed methods are discussed. The exact mixed methodology adopted is then outlined; utilising secondary data and public health recommendations to calculate the fruit and vegetable requirement; the presentation of a food system approach to stakeholders; visioning; semi-structured interviews; workshops and participatory engagement. Details of the sample are then provided. Finally, there are some comments on timescale and data analysis, and reflections on ethics and consent.

Chapter 4 (Requirement) provides an empirical analysis of the population fruit and vegetable requirement of Wales and the UK. It looks at the implications of waste on this requirement and of linking the requirement to production in terms of land needs. It then compares the requirement to consumption and availability. The second half of the chapter goes on to explore stakeholders' views on how much of the fruit and vegetable requirement should be grown in Wales and how they reacted to the presentation of the requirement and associated data. The chapter details how the requirement was used and then goes on to look at some scenarios, generated during the interviews and workshops, for possible future horticultural production in Wales and the UK.

Chapter 5 (Barriers and Enablers) notes that knowledge of the fruit and vegetable requirement and the availability and consumption 'deficit' stimulated a wide-ranging discussion of the other barriers to and the potential enablers of greater production. It explores the barriers to and potential enablers of greater horticultural production and consumption, as described by stakeholders during interviews and workshops, as well as during subsequent engagement.

Chapter 6 (Peas Please) outlines the involvement of the researcher through Solidarity Action Research (a type of PAR) in the development of Peas Please, a national initiative aimed at increasing the consumption of vegetables through a food system approach. It gives a history of the initiative, detailing the Vegetable Retreat, the launch of Veg Facts, Food Cardiff's decision to join the project board, the

participatory workshops leading to the development of a commitments framework, the Veg Pledges from across the supply chain and the 2017 Vegetable Summit. It then looks at monitoring and evaluation, Veg Power and the development of the Fruit and Vegetable Alliance.

Chapter 7 (Discussion) examines some of the issues emerging from the research, such as neoliberalism and where the research fits in relation to it. It looks in more detail at divergence in the food system and looks at the benefits of convergence and how the fruit and vegetable requirement and a food system approach may be facilitative. It also explores the complexities and drawbacks of convergence. The food system approach adopted by Peas Please is summarised and compared to other approaches, and advantages and disadvantages are discussed. There is examination as to whether the approach can lead, or has led, to systemic transformation around increasing vegetable consumption. The chapter then explores how the research findings of this thesis might contribute to theory, particularly food systems, political ecology and Actor Network Theory. The final section reflects on the Participatory Action Research process, and its weaknesses and strengths.

Chapter 8 (Conclusion) reflects on the findings of the Participatory Action Research (PAR). It gives a summary of the thesis, with answers to the research questions, and reflects more deeply on practice and what it might take to facilitate positive food system change. It finds that, given the divergences in the food system and complexity of the challenge, a new food diplomacy is being utilised. It goes on to outline what this ‘new food diplomacy’ involves and make recommendations for practice.

2 Literature Review

2.1 Chapter overview

This literature review chapter outlines a brief history of the food security narrative and its links to productionism and neoliberalisation. It then goes on to explore the nutrition transition to unhealthier eating patterns and rising malnutrition alongside the persistence of undernutrition as well as ecological problems associated with the modern food system. It then explores suggested solutions often expressed as alternatives to the dominant neo-productionist food security approach, such as food sovereignty, the right to food, the livelihood approach, community food security, and sustainable diets.

A review of the literature leads to the suggestion that answers to increasing food security and sustainability might lie in convergent approaches; that is, bringing diverse actors within the food system together. A number of potentially insightful theoretical tools are introduced. It is suggested that combining public health nutrition and agri-food research might be a useful starting point and that one way this could be done is by linking production to consumption of place. Wales and fruit and vegetables, were the starting points to link the consumption requirements of people to place, and the reason for the approach is outlined.

The last part of the chapter explores how fruit and vegetables are recognised as being of health benefit, and examines the recommended intakes that have been suggested and promoted by UK and worldwide bodies. The chapter looks at some detail at these campaigns, which under the influence of neoliberalisation, have been individual and consumer[2] focused in the main, with the '5 (+) a day' being most popular. And yet the evidence shows that consumption worldwide in general has not increased over the last 30 years, and in Wales it has decreased. At the same time, the production of fruit and vegetables in the UK and Wales has gone down and the UK has become increasingly dependent on imported and exotic products. Evidence shows that consumer education programmes alone, without consideration of the wider fruit and vegetable supply chain and food environment, have been largely

[2] It is acknowledged that the term consumers is linked to the neoliberalism narrative. However, it is used in this thesis as a practical term to describe people as 'eaters' within the food system, rather than producers or processors and so on.

ineffective and that different approaches may be needed to deliver positive changes in diet and sustainability more generally.

2.2 Brief history of food system development and food security narrative

For the purpose of this thesis, the broad food system is conceived of along the same lines as described by the 'Global Panel on Agriculture and Food Systems for Nutrition' in that it comprises "all the processes involved in keeping us fed: the food supply, food environments and food consumers" (Haddad *et al.*, 2016, p.81). In order to understand the dynamics underlying the present 'mainstream' food system and potential solutions to food security and sustainability, it is necessary to set the context by briefly examining the development of the food system in the 20th century. The terms productionism, post-productionism, neoliberalism, neoliberalisation and neo-productionism are explored and how these relate to dominant discourses around food security today.

Food security is most commonly defined as existing "when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO, 1996, p.2). Although this may seem a benign statement, a brief overview of the development of this definition shows how it has changed over time and that it has become associated with certain suggested policy solutions. As Jarosz argues (2014, p.168), "food security and food sovereignty discourses are tied to distinctive political and economic histories, ecologies, and identities at the national and local levels".

According to Candel (2014, p.47) food security is a consensus frame, "a term that finds broad resonance and consent, but which is used to make diverging, and sometimes conflicting, claims". Kirwan and Maye (2013) refer to there being fractured consensus on food security. In order to understand how food security is often interpreted and contested it is necessary to briefly explore the origins and development of this definition alongside a brief history of the development of the modern food system, post World War Two.

In the UK (and Europe), the political conclusion following World War Two hunger and rationing, was that an over reliance on international trade for food provisioning had been a risk to food security and that this had to be mitigated by increased domestic

production. This resulted in a period of investment in agriculture that has become known as the productionist era, when, in the main, food production and national self-sufficiency became the driving forces of agricultural and food policy (Barling, Sharpe and Lang, 2008). This was aided by the 1947 Agriculture Act with its emphasis on "promoting and maintaining … a stable and efficient agricultural industry capable of producing such part of the nation's food and other agricultural produce as in the national interest it is desirable to produce in the United Kingdom" (UK Government, 1947, Part 1). Guaranteed prices and regulations meant "an official target to increase net output of UK agriculture by 50% over pre-war levels … was met by 1952, albeit unevenly across sectors" (Defra, 2006, p.13).

Food and farming became major political concerns worldwide in the 1950s (Lang and Schoen, 2016). Three main stakeholders were given the responsibility for solving the problem: large agricultural producers from industrialised countries, their national governments, and transnational corporations (Sonnino, Marsden and Moragues-Faus, 2016). Food production and processing had been increasingly mechanised since the 19th century and this process was further intensified during the 1950s (Collingham, 2011). The application of chemical, transport, breeding and energy technologies, as part of what some call the 'green revolution', transformed the food supply[3] (Lang and Heasman, 2004).

In response to price spikes, crop failures and famines in the early 1970s, the US led the call for increases in grain production and reserves, and for food to be transferred from places of surplus to deficit (Kissinger, 1974). This echoed food transfers from the US to Europe in World War Two (Collingham, 2011) but affirmed the notion, still held by advocates of the productionist paradigm today, that food security is best delivered by economic development and trade. As Jarosz (2014, p.171) articulates "the view of the haves and have-nots separated by technological access and innovation, good fortune and geography remains popular and influential today and contributes to the persistent idea that European Union (EU) and American farmers feed the world (Fish, Lobley and Winter, 2013)".

In the 1980s UK levels of self-sufficiency were high and there was an overproduction of food in Europe leading to 'butter mountains' and 'wine lakes' (Defra, 2006). But

3 The negative environmental and social externalities of this have become increasingly apparent as discussed in Chapter 1.

despite this, undernourishment and famine were still a persistent problem particularly in some areas of the Global South. This led some, most notably Amartya Sen (1981), to popularise the idea that hunger is not usually the result of there not being enough food per se but a problem of distribution, and turned the discussion towards entitlement and access.

At this point, according to Sonnino *et al.* (2016) and Jarosz (2011), perspectives on how to achieve food security divided into the 'livelihood approach' which started examining demand-side strategies of the poor to access food[4] and the state approach which increasingly saw food insecurity as a result of lack of individual purchasing power.

Food self-sufficiency became decoupled from food security. There was a shift to producing according to comparative advantage and purchasing some food requirements from the market (Peljor and Minot, 2010). This was the beginning of what some term the post-productionist era (Marsden, 2013). Within the EU, subsidies under the Common Agricultural Policy (CAP) were increasingly decoupled from production (Defra, 2006). This shift from a 'supply-driven' to 'market-led' food chain changed the focus of food security from farmers and agricultural self-sufficiency towards retailers and the whole food chain.

With the election of Margaret Thatcher in the UK and Ronald Reagan in the USA, in 1979 and 1981 respectively, came the advancement of the neoliberal paradigm: a philosophy that values individual liberties, primarily free enterprise, over all else (Harvey, 2005). The 'mainstream' food system since then has become increasingly dominated by economism, that is to say a tendency to "believe that economic considerations and values are the most important ones"[5] (Carlisle and Hanlon, 2014, p.407). Although Moore (2010, p.389) contends that "'Neoliberalism' is a mighty signifier, and one mobilized to describe all manner of socio-ecological movements in every region and at every scale since the early 1970s" and that "the era as a whole is a messy bundle of contradictions that defies neat and tidy definition". Others have provided a broad definition. Guthman, for example, argues that neoliberalism has:

[4] This was particularly developed in the Global South and will be discussed in the food sovereignty section.
[5] This simplistic view, as discussed later, is critiqued by Gibson-Graham, J.K. (2006) *A Post-Capitalist Politics.* Minneapolis: Published by the University of Minnesota Press.

> "guided policy efforts to privatize public resources and spaces; minimise labour costs … reduce public expenditures on entitlements, subsidies and other sorts of redistributive welfare; eliminate regulations seen as unfriendly to business, especially health, labour and other protections; and reduce taxes in order to spur more private investment." (Guthman, 2011, p.17)

In relation to food consumption, some argue that neoliberal governance encourages people to act through the market by exercising consumer choice, being entrepreneurial and self-interested, and striving for self-fulfilment; thus shifting responsibility for health from society to the individual (Guthman, 2011). Although in this retreat from state control, as Morgan, Marsden and Murdoch (2006b, p.26) argue, "even neo-liberal governments in OECD countries have accepted the political compact between farming and the state on account of the 'exceptionalism' of agriculture" in that "... we ingest its products".

Castree (2010, p.5) contends that the term neoliberalism "is very much a critics' term, an oppositional badge as much as an analytical concept … rarely invoked before 2000, it is now part of the *lingua franca* of left-wing social scientists and activists". He suggests that neoliberal policies, rather than being homogenous, have unfolded differently across national, regional and local socio-ecological areas. To account for this heterogeneity, as introduced by Tickell and Peck (1995), many academics favour using the term neoliberalisation, which "describes an ongoing, unfinished process of proposing, revising, testing, applying, and further altering neoliberal ideas and policies" (Castree, 2002, p.12). Because it is perhaps a more neutral term, the word neoliberalisation is used in this thesis, though the discussion introduces the concept of 'not quite neoliberal' activities.

The ongoing process of globalisation meant that foods, throughout the 1980-1990s, became increasingly traded and distributed across the world, reducing seasonality and links to food provenance (Morgan, Marsden and Murdoch, 2006b). Global links became increasingly consolidated and vertically integrated. Large companies began to produce, process, and retail food on a national and global scale; a pattern that is still dominant today. In general, the globalisation of agriculture has been accompanied by concentration of market power away from producers into the hands of a limited number of large-scale trade and retail agribusiness companies (Lang and Heasman, 2004) who "are playing a growing role, relative to the public sector, in the availability, affordability, safety and desirability of foods" (Haddad *et al.*, 2016, p.17).

The global ‘food regime’ became dominated by global flows of capital and global commodity chains (McMichael, 2009). The second half of the 20th century was particularly marked by retail industrialisation and concentration of power in the ‘middle of the food chain’ sometimes depicted as an hourglass structure:

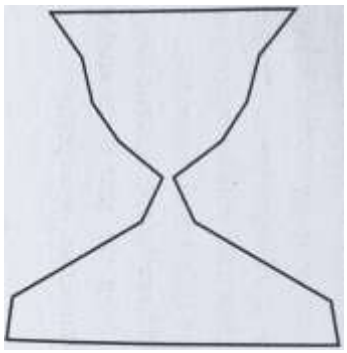


Figure 1. The hourglass: the concentration of power and players in the ‘mainstream’ food system (Netherlands, Germany, France, UK, Austria and Belgium)(Patel, 2007, p.13).

Jarosz (2014) contends that International food security discourses emerged during the 1970s Global North and developed under the influence of neoliberal globalisation policies, and that they are aligned with neoliberal notions of development and economic growth as expressed in World Bank and FAO documents. Food security, which had previously been seen in terms of national self-sufficiency, became seen as an outcome of a globalised food system:

> “Food security is embedded in dominant technocratic, neoliberal development discourses emphasizing increases in production and measurable supply and demand and is aligned with transnational agribusiness and institutions of governance at the national and international scales.” (Jarosz, 2014, p.169)

In 1986 the World Bank changed the definition of food security to being “achieved only if all households have the ability to buy food. There is no necessary link between self-sufficiency and food security” (World Bank, 1986, p.31). This change of definition was key, as it aligned food security with other forms of development that could be achieved through an extension of neoliberalisation; for example: trade liberalisation and integration into global markets. In other words, food security became something that could be achieved by individuals or groups through income generation.

Within the UK, this dominant productionist narrative of food security has been widely adopted. For example, the UK Food Security Assessment (Defra, 2009) notes that UK food security depends on being able to source food from a variety of countries and that this diversity of supply enhances security by spreading risks, widening options and keeping prices competitive.

According to a recent House of Commons report, "Defra's food security remit means that it is a core Defra responsibility to ensure that nutritious food is available at an affordable price" (Environment Food and Rural Affairs Committee, 2015, p.4). Hidden within this statement is an implicit neoliberal productionist framing: that food security will ensue provided that nutritious food is available (productionism) and that people can afford to buy it (neoliberalism). What this framing fails to address is the structure in which purchasing decisions are being made, inequalities, and how the food environment is shaping consumption.

Equally, the food security narrative is mirrored in Welsh Government food policy. Food security in a Welsh context is defined along the same lines as the UK (National Assembly for Wales, 2011, p.8):

> "The Welsh food system is highly integrated with UK and European food systems in social, policy and commercial terms. In addition, global food security depends on there being enough food (and sufficient access to that food) to feed everyone. Therefore, Welsh food security should be considered in a global context as well as in the European, UK and national contexts."

The main food planning approach at a state level in Wales is to support the development of the food business sector to increase growth and deliver sustainability and food security[6] (Welsh Government, 2014a).

This chapter, in light of the food security framings outlined, moves on to look at some of the solutions that have been proposed to address the 'new fundamentals'.

For some commentators operating within the 'mainstream' framing, the answer to food security in the light of the 'new fundamentals', has been a renewed call for increased production, through increasingly technological solutions (Garnett, 2014). This new wave of productionism, some refer to as neo-productionism or neo-

6 This narrow approach has recently been critiqued by Marsden, T., Morgan, K. and Morley, A. (2016) *Food Policy as Public Policy: A Review of the Welsh Government's Food Strategy and Action Plan.* Cardiff: Public Policy Institute for Wales.

productivism (Sonnino, Marsden and Moragues- Faus, 2016). One manifestation of neo-productionism is a drive towards sustainable intensification (Godfray *et al.*, 2010). In response to projected population increases to around 9 billion by 2050, and in the light of an acknowledgement of environmental limits such as land availability (Ambler-Edwards *et al.*, 2009) there has been a renewed focus, by some, on increasing production in a sustainable way. This became known as sustainable intensification and although it had its origins in agro-ecological practices of small-scale producers in Africa (Pretty, Toulman and Williams, 2011) it has been adopted as a justification for the development of more industrial and principally biotechnological forms of agriculture (for example the use of Genetically Modified Organisms) (Royal Society, 2009).

The efficiency perspective, in contrast, critiques the need to produce more food, instead arguing that there are demand side solutions to decrease the need for increased consumption; for example: waste reduction, re-direction of foods back from bio-fuel production, and changing consumption patterns (Garnett, 2014). Cassidy *et al.* (2013, p.1) express a demand-side approach when they explain that:

> "36% of the calories produced by the world's crops are being used for animal feed, and only 12% of those feed calories ultimately contribute to the human diet ... Additionally, human-edible calories used for biofuel production increased fourfold between the years 2000 and 2010, from 1% to 4%, representing a net reduction of available food globally. Growing food exclusively for direct human consumption could, in principle, increase available food calories by as much as 70%, which could feed an additional 4 billion people."

In summary, although there are other approaches to the challenge of food security, which are examined in greater detail below, the prevailing neoliberal discourse still presents "global markets, agrarian biotechnologies and multinational corporate initiatives as structural preconditions for alleviating world hunger" (Nally, 2011, p.49).

2.3 Malnutrition

Many contend that globalisation of markets has created food systems which are food secure and provide nutritious food for all; that there is an abundant supply of food from a diverse range of sources, contributing to the resilience and price stability of

the food system, and that as a result, high-income countries are reported to expect cheap, safe and varied food year-round (Foresight, 2011). However, at the same time, there is evidence of increasing malnourishment in the form of a nutrition transition happening across the world from healthier diets high in fibre, wholegrains, fruit and vegetables to unhealthier diets high in meat, dairy products, vegetable oils, refined starches and sugar, sweetened drinks and other processed food (Popkin, Adair and Ng, 2012). Some (Otero *et al.*, 2015) call it the 'neoliberal diet' and point out that its emergence has gone hand in hand with neoliberalisation.

The nutrition transition, a model first proposed by Popkin (1993), describes the changes in diet that are associated with the demographic transition[7] and epidemiologic transition[8] (Omran, 2005). The changes in diet are characterised by high levels of processed foods, snacking and out-of-home eating, and this is now the dominant dietary pattern across the world. Along with more sedentary lifestyles, this dietary pattern has been linked to the global rise in obesity across the world since the 1970s that disproportionately affects the poor (Popkin, Adair and Ng, 2012, Otero *et al.*, 2015). Commentators also acknowledge, however, that "while these characteristics are clear, they are not the same everywhere. The reality is a complex picture of a heterogeneous mix of trends between foods and countries" (Hawkes and Popkin, 2015, p.2).

The rise in obesity and associated non-communicable diseases, along with ecological degradation, are described by some as negative externalities of the 'mainstream' food system, in that the true cost of the negative effects are not accounted for within the system and are felt elsewhere (Pretty, 2003, Lang and Heasman, 2004)

At the global scale, age-specific mortality has steadily improved over the past 35 years (Wang *et al.*, 2015). However the number of deaths from most non-communicable diseases is increasing in most countries; overall total deaths rose by 14.1% to 39.8 million between 2005 and 2015 (Wang *et al.*, 2015). Some of this is due to poor diet. According to the 'Global Panel on Agriculture and Food Systems for

[7] The demographic transition: from high to low levels of fertility and high to low levels of mortality and increased life expectancy.
[8] The epidemiologic transition: from high levels of infectious diseases associated with malnutrition, famine and poor sanitation, to high levels of non-communicable diseases associated with industrialisation and urbanisation.

Nutrition' (Haddad *et al.*, 2016, p.17), "Six of the top 11 risk factors driving the global burden of disease are related to diet" as illustrated in Figure 2:

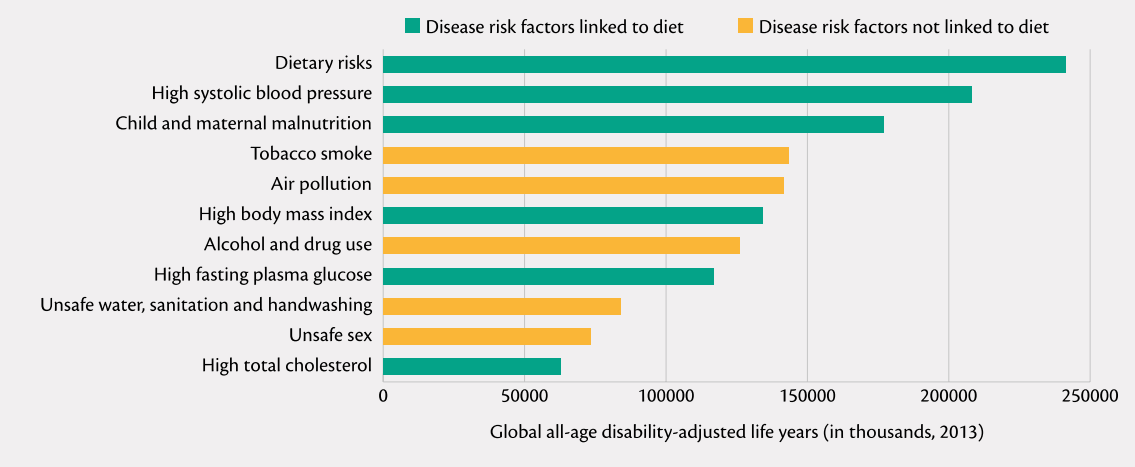


Figure 2. Risk factors driving the global burden of disease (Haddad *et al.*, 2016, p.17).

In the UK it is estimated that around 33,000 deaths per annum could be avoided if UK dietary recommendations were met; over 15,000 of these deaths could be avoided by increased consumption of fruit and vegetables (Scarborough *et al.*, 2012).

The number of overweight and obese people worldwide is estimated to be over 2.1 billion, up from 857 million in 1980 (Ng *et al.*, 2014). Datasets from the US (Anthony *et al.*, 2018) show that the prevalence of obesity has risen across all age groups since the 1970s (see Figure 3):

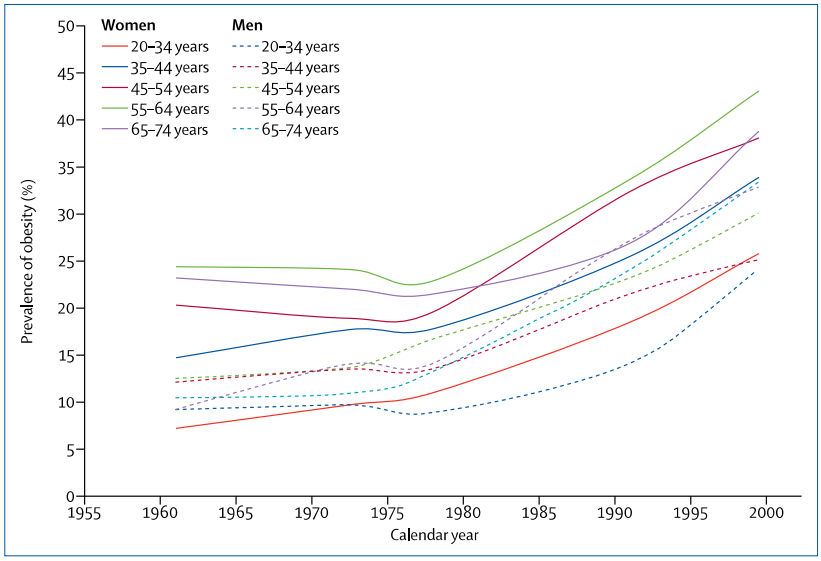


Figure: **Prevalence of obesity, by age and sex**
Data from US Centers for Disease Control and Prevention, National Health and Examination Surveys (1960–2000).[4]

Figure 3. Prevalence of obesity, by age and sex in the US from Anthony *et al.* (2018, p.e162).

Whereas obesity prevalence has more than doubled worldwide since 1980 (Ng *et al.*, 2014), in the UK it has tripled. In 1980 only 6% of men and 8% of women were obese compared to 24.9% in 2013 (NHS, 2015). According to the FAO (2013), the UK now has the highest prevalence of obesity in Europe, above Ireland (24.5%), Spain (24.1%), Portugal (21.6%), Germany (21.3%), Belgium (19.1%), Austria (18.3%), Italy (17.2%), Sweden (16.6%) and France (15.6%). Recent data from analysis of the Health Survey for England show that between 1991–93 and 2011–13 the proportion of overweight and obese individuals has increased from 66.7% to 76.8% for men, and from 54·8% to 63·4% for women (Lancet, 2017).

No country in the world has seen a reversal of the trend of increasing levels of obesity. While being overweight and obese tends to be more prevalent in higher income groups in low-income countries, this trend is reversed in wealthier countries (Jones-Smith *et al.*, 2011). Rising levels of overweight and obesity have precipitated rising levels of diabetes (Haddad *et al.*, 2016). Worldwide there are currently 415 million adults who have diabetes and by 2040 this is predicted to rise to 642 million (International Diabetes Federation, 2015). Some consider that rising levels of obesity have brought a reduction in deaths from other causes and that the problem is often exaggerated (Guthman, 2011). However, in general, there is agreement that the new

pattern of disease should not become the new norm and that action is needed in order to reverse the rising levels of non-communicable diseases in order to improve quality of life and decrease pressure on healthcare systems (Lancet, 2017).

Much progress has been made in reducing the prevalence of undernourishment. However, at the same time as levels of obesity are increasing, it is estimated that 795 million people are still undernourished worldwide (see Figure 4):

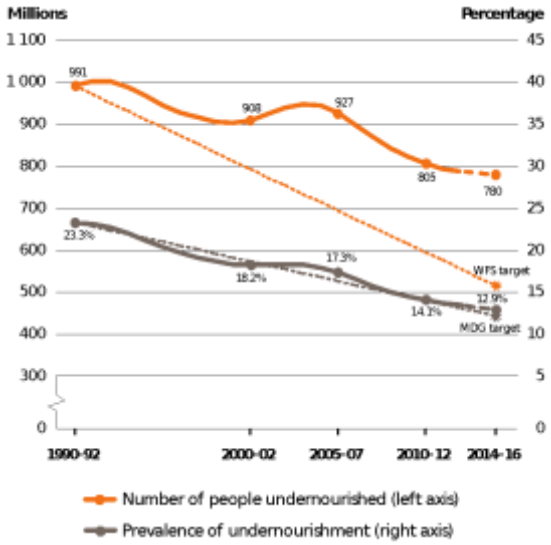


Figure 4. The trajectory of undernourishment in developing regions: actual and projected progress towards the Millennium Development Goals and World Food Symposium targets (FAO, 2015, p.9).

The FAO consider that two key factors in the reduction have been economic growth (particularly economic growth that is inclusive and provides opportunities for the livelihoods of the poor, including family farmers) and social protection mechanisms. That undernourishment still exists is not a result of there not being enough food to eat; rather, it is caused by other factors such as human induced or natural disasters, political instability and inequality. Some argue that that economic factors and unequal trade relations and policies can and do exacerbate food shortages (Devereux, 2009) as discussed later in relation to food sovereignty discourses. There is also some evidence that in Europe the 2007–2008 financial and "'food crisis' and associated dismantling of the welfare state has created increases in food and energy poverty" (Moragues-Faus and Marsden, 2017, p.275), partly indicated by the emergency food provision in the UK (Lambie-Mumford, 2014).

There is a lack of consensus about what should be done to decrease the prevalence of malnourishment worldwide and improve the food system in general. The next section explores discourses often seen as being in opposition to the 'mainstream' food security framing and neo-productionism: food sovereignty, the right to food, the livelihood approach, community food security and sustainable diets. It draws on the work of Sonnino, Marsden and Moragues-Faus (2016).

2.4 Theoretical overview of 'alternative' food system related literature

Food sovereignty discourses emerged to counter neoliberal practices and the globalisation of food and agriculture and formed one part of grassroots resistance to the implementation and effects of these policies (Jarosz, 2014). Initially, they were part of anti-globalisation discourses related to issues of international trade and agricultural subsidies. In particular, these were a response to the rolling back of protectionist policies in the Global South at the same time as the Global North subsidised production which had led to the flooding of Southern markets with cheap imports and many farmers going out of business (Lang and Heasman, 2004).

In contrast with other forms of productionism, food sovereignty sees globalisation as the cause of, rather than the solution to, food insecurity; which is framed as an outcome of unequal global trade relations:

> "...food sovereignty discourses emerge from civil society and NGOs and align with Marxist political economy/ecology discourses within and outside academia. These discourses stress the importance of analyzing power relations and capitalist developments' impacts upon agricultural development, local ecologies, hunger, and poverty." (Jarosz, 2014, p.170)

Food Sovereignty adopts an anti-globalisation stance to corporatised food systems (Patel, 2009) and advocates for the right to more control over food. The food sovereignty definition as advocated by Via Campesina has evolved over time, but the most cited definition, from the Declaration of Nyéléni in 2007, is:

> "Food sovereignty is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems." (Forum for Food Sovereignty, 2007, p.1)

As opposed to biotechnological fixes and other industrial farming methods, food sovereignty advocates for small family farms using agro-ecological practices such as

organics, biodynamics, permaculture and agroforestry, which have the underlying aim to “maintain the resource base upon which they depend” (Gliessman, 1998, p.3). The criticism is that ‘mainstream’ forms of productionism have a tendency to prioritise technological solutions and market objectives over social and environmental outcomes (Lang, 2010). The People’s Food Sovereignty movement states:

> “We cannot allow agroecology to be a tool of the industrial food production model: we see it as the essential alternative to that model, and as the means of transforming how we produce and consume food into something better for humanity and our Mother Earth.” (People's Food Sovereignty, 2015, p.2)

The International Assessment of Agricultural Knowledge, Science, and Technology for Development (IAASTD) report (2009) represents an example of the food sovereignty discourse influencing an international policy document. The report offers an attempt at converging food security and food sovereignty discourses by recognizing both as equally valid. It recognises that food sovereignty and associated small-scale producers and methods have a role to play in alleviating hunger. While the report does not openly oppose biotechnological solutions, as advocated by ‘mainstream’ neo-productionists, for example the use of Genetically Modified Organisms (GMOs), it states that these alone will not solve the problems of hunger. Of the 57 countries involved in the construction of the report, Canada, the USA and Australia would not sign up to it on the grounds that they did not share the vision outlined. It is contended that the issue of GMOs is one of the main areas of divergence between the different discourses (Jarosz, 2014).

The livelihoods approach came out of Sen’s (1981) articulation of the problem of food security not being about there being too little food produced, but about people’s ability to access and procure it. This shifted the onus of food security from the state to the individual and to poverty alleviation. Livelihood sustainability then becomes central to achieving food security. The FAO has adopted the livelihood approach alongside economic development as a joint solution to food security (FAO, 2015). It could be argued, however, that the individualisation of food security under this approach has shifted the discussion away from some of the structural inequalities that food sovereignty exposes. Some claim that unfortunately “the livelihood security approach has been appropriated for reinstating a neoliberal and commodified view of

food as a tradeable commodity, rather than as a human right" (Sonnino, Marsden and Moragues- Faus, 2016, p.484).

Social movements around the right to food are an extension of the livelihood approach and advocate for more control over the ability to feed oneself. The right to food as outlined by De Shutter (2014a, p.3) is:

> "The right to have regular, permanent and unrestricted access, either directly or by means of financial purchases, to quantitatively and qualitatively adequate and sufficient food corresponding to the cultural traditions of the people to which the consumer belongs, and which ensure a physical and mental, individual and collective, fulfilling and dignified life free of fear."

Some argue that it is the duty of the state, as outlined in international law, to ensure adequate and sustainable food for all (Salmon, 2014). They argue that the right to food is recognised in international law under the 1948 Universal Declaration of Human Rights (Article 25) as part of the right to an adequate standard of living, and is enshrined in the 1966 International Covenant on Economic, Social and Cultural Rights (Article 11) (De Schutter, 2014a). More recently (1999), they argue, it is set out in the UN General comment No.12 on the right to food. This article makes clear that all state parties, as an absolute bare minimum, must ensure that their population has access to at least enough food to stave off hunger and then as fast as possible they are required to move toward a culturally embedded, socially just and durable right to food, for all (Salmon, 2013). De Schutter, the UN Special Rapporteur on the right to food (2008-2014), goes further, as do Via Campesina, suggesting that the right to food extends to having access to resources to produce food; such as land and water (Jarosz, 2014). The right to food is widely accepted by nations, with the exception of the USA and four other countries (Anderson, 2013). Concepts of food democracy (Lang, 2005) and food citizenship (Renting, Schermer and Rossi, 2012) also advocate for a greater role of individuals in influencing or controlling their food systems.

Community food security, from the USA, brings the discourse of food security from the individual to a community of place level. Though it is an area in need of further theorising it has been defined by Hamm and Bellows (2003) as a "situation in which all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system that maximizes community self-reliance and

social justice". It envisions decentralised, environmentally beneficial food systems which are supportive of collective needs and "effective in assuring equitable food access, and created by democratic decision making" (Anderson and Cook, 1999, p.141). A main theme of community food security is that it emphasises the food environment as a source of food insecurity:

> "To improve health outcomes and communities' control over their members' food choices, multiple facets of the food environment need to change simultaneously and policy incentives need to facilitate these changes." (Anderson, 2013, p.117)

Anderson claims that the results of community food security approaches have been modest and fragmented. Though community food security approaches may have succeeded in changing some community food environments, these have tended to be through market-based solutions (Weiler *et al.*, 2015). Advocates of food sovereignty approaches suggest that only addressing the food environment does not fundamentally change the power dynamics which are a source of food insecurity (Anderson, 2013). As Sonnino *et al.* (2016, p.483) identify from Anderson and Cook (1999) more needs to be done to "articulate a clear framework around the concept of food security – its unit of analysis ... its relationships with individual, household and national food security; the indicators through which it can be evaluated; its determinants; and the main stages in the process towards it."

Some suggest that, implicitly, future generations, and hence sustainability, are considered within the food security definition (Global Food Security, 2010). Other writers argue that food security definitions need to be expanded, to be defined in terms of sustainable diets. Sustainable diets have been defined as:

> "those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources." (FAO, 2012, p.7)

Mason and Lang (2017) see sustainable diets as outlining a complex set of 'omni-standards' or 'poly-values' around quality, environment, economy, social values, health and governance. How the rhetoric and aspiration for sustainable diets will be translated into action remains unclear.

Many writers, activists, farmers and communities have engaged, using food sovereignty and other framings outlined above, in trying to develop different, more sustainable food systems explicitly in opposition to the neoliberalised, industrialised, multinational, vertically integrated, food system. These have often been termed 'alternative' in that they seem to originate as a reaction to a negative trend in the 'mainstream' food system (Morgan, Marsden and Murdoch, 2006a). In many instances they are also associated with some kind of 'quality turn':

> "alternative supply chains in one form or another seek to challenge the conventional agri-food system by providing economic, social and/or environmental benefits." (Adams, 2015, p.32)

Examples of what are termed 'alternative' food systems are organisations and initiatives that bring small-scale farmers, artisan food producers and restaurant chefs together with consumers for the market exchange of what is often characterised as fresh, local, seasonal, organic, and craft-produced food (Guthman, 2011). They are generally associated with shorter supply chains that attempt to connect the consumer more directly with the producer. Some examples are Community Supported Agriculture (CSA) schemes and other local box schemes and farmer's markets.

There has been a large amount of academic research on 'alternative' food systems or networks, local food systems, sustainable food systems and so on. A major preoccupation of 'alternative' food system approaches has been how they can be scaled up; for example by the development of 'a missing middle' (Morley, Morgan and Morgan, 2008) or a networked 'System of Sustainable Food Systems' (Blay-Palmer, Sonnino and Custot, 2016). Many have been concerned with ways of developing 'alternative' food systems and spreading new ways of operating, to achieve food system transformation.

The extent to which such a transformation is possible (Jones, 2012) or desirable however has been questioned (Guthman, 2011) and commentators highlight a lack of empirical data on the contribution local food systems can make to UK food security (Goodman, Maye and Holloway, 2010). As Kirwan and Maye (2013, p.99) note:

> "At present, although there are a wide range of significant local food initiatives in the UK, there are currently no comprehensive data sets on the quantity of food that is produced through local food systems, nor any coordinated overview of their

> contribution to improving social inclusion through the medium of food, or helping to overcome food poverty."

In their evaluation of the question "are local food chains better than global?" Brunori *et al.* (2016, p.1) find that "a closer view of the food system demonstrates a highly dynamic local–global continuum where actors, while adapting to a changing environment, establish multiple relations and animate several chain configurations". When the simplified dichotomy is examined further, some find that "although abstract distinctions between 'alternative' and 'mainstream' food systems can be made, there are no clear boundaries between them" (Sonnino and Marsden, 2006, p.184) and it is an overly simplistic to draw a division between 'global capitalist actors' and their 'embedded local counterparts' (Goodman, 2004).

This literature review has highlighted a tendency for much of the research to be polarised, concentrating on one set of solutions or another. As Marsden and Morley highlight, there has been much concentration on 'alternative' food systems in research over the last ten years; but they claim this has, in the main, failed to address questions of scaling out and convergence. This has led them to question whether "these alternatives provide a real basis for progressive political contestation and development or sustained post-neoliberalised and post-carbonised transition" (Marsden and Morley, 2014, p.215).

There has been less research that takes an integrational approach in relation to the whole food system, encompassing both 'alternative' and 'mainstream', though this is changing. Kirwan and Maye (2013) call for research into how local food systems can be coordinated with national and international food systems, rather than envisaging the two systems as being mutually exclusive and oppositional. Blay-Palmer *et al.* (2013, p.525) note that "while conventional food systems demonstrate increasing challenges, for example, nutritional crises in the form of malnutrition and obesity, food price spikes, biodiversity degradation and land-use conflicts, the conventional system may also offer spaces for change". Goodman (2004, p.112) also points out that although industrial agriculture is central to European rural development "… its social and spatial patterns, and ways in which the 'old' might shape the 'new' receive little analytical attention."

Lang and Heasman (2004) talk of a war between two different paradigms, which have emerged to solve the health problems of the productionist era, the life sciences integrated paradigm and the ecologically integrated paradigm. The life sciences integrated paradigm, along the lines of neo-productionism, offers an "almost industrial model of health in that it promises the capacity to understand the constituent parts of disease and the human's capacity to fall prey to particular diseases, and then offers long-term personalised dietary solutions" (Lang and Heasman, 2004, p.37). The 'mainstream' food system at present tends to sit within the life sciences integrated paradigm. The ecologically integrated paradigm, by contrast and in common with 'alternative' food system narratives, is centred on ecology and "health as something that is intrinsic to each stage of the growing and distribution process". Currently the life science integrated paradigm has more commercial backing and power, though the ecologically integrated paradigm also has potential to contribute to increasing food security and sustainability. One way of trying to redress this power imbalance is to support proponents of the ecologically integrated paradigm; but another way is to problematise division and look at whether convergence might offer opportunities for more integrated food security and sustainability.

2.5 Convergence and relationality

This thesis attempts to use an integrative approach, looking for food security and sustainability solutions that combine different stakeholders, that offer convergence. It is an approach advocated by many, including Sonnino *et al.* (2016) and Misselhorn *et al.* (2012, p.7) who suggest that "essential elements in a successfully adaptive and proactive food system include … high levels of interaction between diverse actors and sectors ranging from primary producers to retailers and consumers."

It is a premise of this thesis that convergence might be achieved by examining aspects common to all discourses. Instead of looking for what divides different actors within the system this thesis therefore looks at what might unite them. Looking more closely at the food security, sovereignty and other discourse definitions, we can see that although they may differ in the suggested mechanism to achieve change, all

agree on the outcome that people should have enough of the right food to eat (see Figure 5):

Food term	**Definition**
Food Security	“When all people, at all times, have physical and economic access to sufficient, *safe and nutritious food* to meet their dietary needs and food preferences for an active and healthy life.” (FAO, 1996, p.2).
Food Sovereignty	“Food sovereignty is the right of peoples to *healthy and culturally appropriate food* produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems.” (Forum for Food Sovereignty, 2007)
Food Rights Approach	"The right to have regular, permanent and unrestricted access, either directly or by means of financial purchases, to quantitatively and qualitatively *adequate and sufficient food* corresponding to the cultural traditions of the people to which the consumer belongs, and which ensure a physical and mental, individual and collective, fulfilling and dignified life free of fear.” (De Schutter, 2014b)

Community Food Security	"A situation in which all community residents obtain a *safe, culturally acceptable, nutritionally adequate diet* through a sustainable food system that maximizes community self-reliance and social justice." (Hamm and Bellows, 2003, p.37)
Sustainable Diets	"Those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; *nutritionally adequate, safe and healthy*; while optimizing natural and human resources." (FAO, 2012, p.7)

Figure 5. Summary of a range of food consumption related discourses.

So, although the term food security has become associated with certain mechanisms of achieving it that are contested, the actual end in itself, that everyone has enough healthy food to eat, is not. It is this common end then, that offers an entry point to bring people together from divergent discourses.

This thesis examines whether, by starting with the agreed goal of nutritionally adequate diet, stakeholders can move beyond divides and explore solutions that may facilitate greater food security and sustainability. In other words, can food security and sustainability be improved by seeking solutions that are convergent? The underlying premise of this thesis is that future food system developments for better food security and sustainability might lie in a combination of efforts by all those involved.

2.6 Multi-theoretical tools

The conceptual tools that help frame the research of this thesis are briefly outlined in this section: ecological public health nutrition, food system approaches to nutrition, expanded concepts of economy from political economy, polycentric governance, and place-based approaches from human geography and political ecology. This combination of approaches which share theoretical starting points is common in food studies. As Goodman (2016, p.1) outlines, food studies have been at the "forefront of post-disciplinarity given that, when one studies food, it is impossible to separate out

the notions of culture, space, economy, politics, and materiality with which it is so thoroughly imbued." Being able to draw on a range of conceptual tools, but not being tied to one in particular, complemented the flexibility required for the Participatory Action Research approach adopted for this thesis. This is elaborated on in Chapter 3 (Methodology).

2.6.1 Ecological public health

Lang recognises two main directions in nutrition (Lang, 2005), one that concentrates on nutrients as key factors in determining individual health (part of the life sciences integrated paradigm), and another that is sometimes referred to as public health nutrition "rooted in social reform and a more classical conception of public health, in which amelioration of diet, (ill) health and supply chains have to be introduced on a population-wide rather than individualised basis" (part of the ecologically integrated paradigm) (Lang, 2005, p.731). Rayner and Lang (2015) summarise five public health approaches:

Public Health Approach	**Summary**
Sanitary-Environmental	Engineering + regulation = health
Techno-Economic	Growth + technology = health
Bio-Medical	Medicine = health
Social-Behavioural	Education + changed behavioural norms = health
Ecological Public Health	Material + biological + cultural + social = health

Figure 6. Summary of public health approaches adapted from Rayner and Lang (2015).

Ecological public health takes on board the cultural, social, and environmental aspects of public health (Lang, Barling and Caraher, 2001) and is broader in scope than other approaches. In relation to food, public health nutrition often assumes an ecological public health perspective. Ecological public health nutrition is a useful conceptual framework as it allows consideration of a broad range of issues that affect food consumption from across the divergent discourses (food security, sovereignty and others).

2.6.2 Food system approach to nutrition

As outlined earlier, for the purpose of this thesis, the food system comprises "all the processes involved in keeping us fed: the food supply, food environments and food consumers" (Haddad *et al.*, 2016, p.81). There are many now advocating for a food system approach to public health nutrition (Neff, Merrigan and Wallinga, 2015, Babu and Blom, 2014, Haddad *et al.*, 2016, Ericksen *et al.*, 2010). This means looking at the whole food system when considering change. According to Ericksen *et al.* (2010, p.32) "Explicitly linking outcomes to the activities of producers, retailers and distributors and consumers is an important research consideration, as food security results from a complex set of interactions in multiple domains." And Haddad *et al.* (2016, p.97): "The food system presents a huge opportunity to act to improve diets. There are many possible actions that can be taken to improve diet quality with entry points in different parts of the food system. Most of these are vastly underutilized."

However, as explained earlier, food systems have become more complicated over the 20th century (Maxwell and Slater, 2003) and because of this, introducing actions which improve food system security and sustainability is a complex area for policy intervention (Smith *et al.*, 2016). Predicting the effect of a policy intervention on a system is not straightforward and tools to help do this have evolved. Some examples of these are Commodity Systems Analysis (Friedland, 1984), Global Production Network Approach (Henderson, 2002) and the Food Regimes approach (Friedmann and McMichael, 1989). This section turns to more specific tools that have been developed to think about food system change. The Global Environmental Change (GEC) food systems approach (Ericksen, 2008) and nutrition oriented value chain analysis (Hawkes and Ruel, 2011) both provide useful frameworks for thinking about food system change. The drivers or influencers of the food system are multiple. To

analyse the dynamic interactions of the food system, Ericksen (2010) proposes a model which sets out food system activities and outcomes in relation to socioeconomic and Global Environmental Change drivers and feedbacks (see Figure 7):

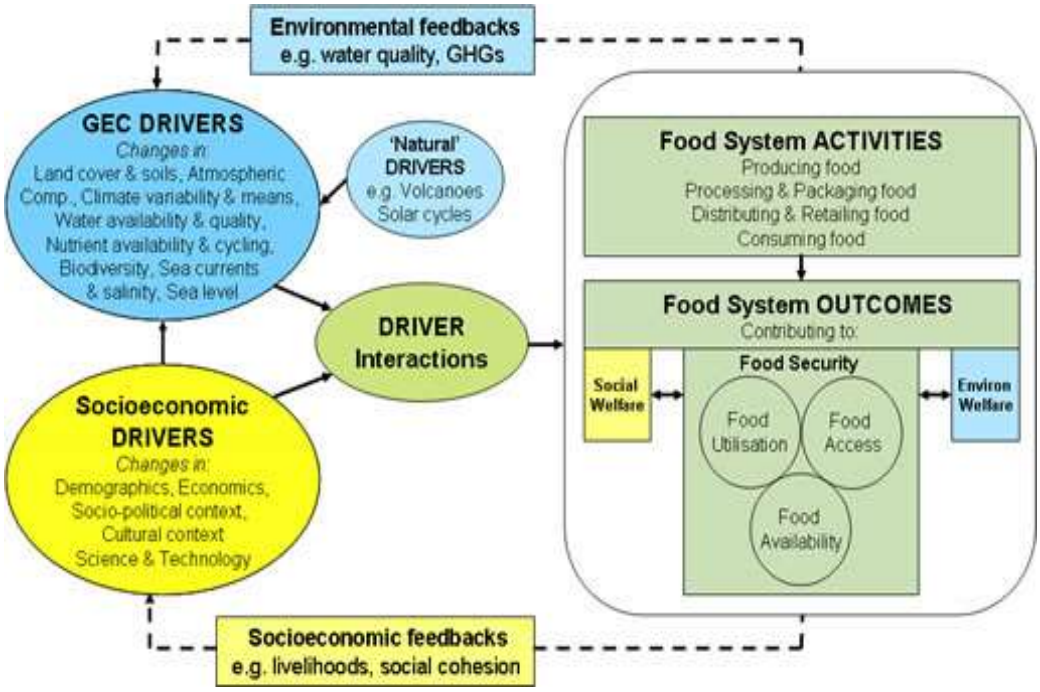


Figure 7. Food Systems, their drivers and feedbacks (Ericksen, 2008, p.28)

Value chain approaches typically look at “the series of activities and actors along the supply chain and what and where value is added in the chain for and by these activities and actors” (Hawkes and Ruel, 2011, p.3). In very broad terms, value chain approaches have historically concentrated on financial value, though they have also looked at a range of other issues such as power in the system and how to generate better outcomes for the poor. Hawkes and Ruel (2011) propose that value chain analysis is a potentially useful tool to understand how food systems are organised, how they are structured, why they function and how they can be leveraged to deliver better nutrition outcomes for consumers. The approach has been endorsed at an international level for example by the International Food Policy Research Institute (IFPRI, 2011) and the Global Panel on Agriculture and Food Systems for Nutrition (Haddad *et al.*, 2016) and there have been a number of studies which utilise this approach to explore its potential; for example: “Value Chains for Nutrition: the applicability of Value Chain approaches to address low fruit and vegetable

consumption in Fiji" (Morgan, 2014). The research for this thesis does not explicitly take a value chain approach to nutrition but draws insight, in that it looks at how food supply chains or systems can deliver better nutrition outcomes for populations. How the findings of the research for this thesis relate to value chain analysis for better nutrition are explored in Chapter 7 (Discussion).

The broader food system is influenced by a number of drivers, but the actual food environment which affects and is affected by consumption is delivered by the food system as illustrated by Haddad *et al*. (2016):

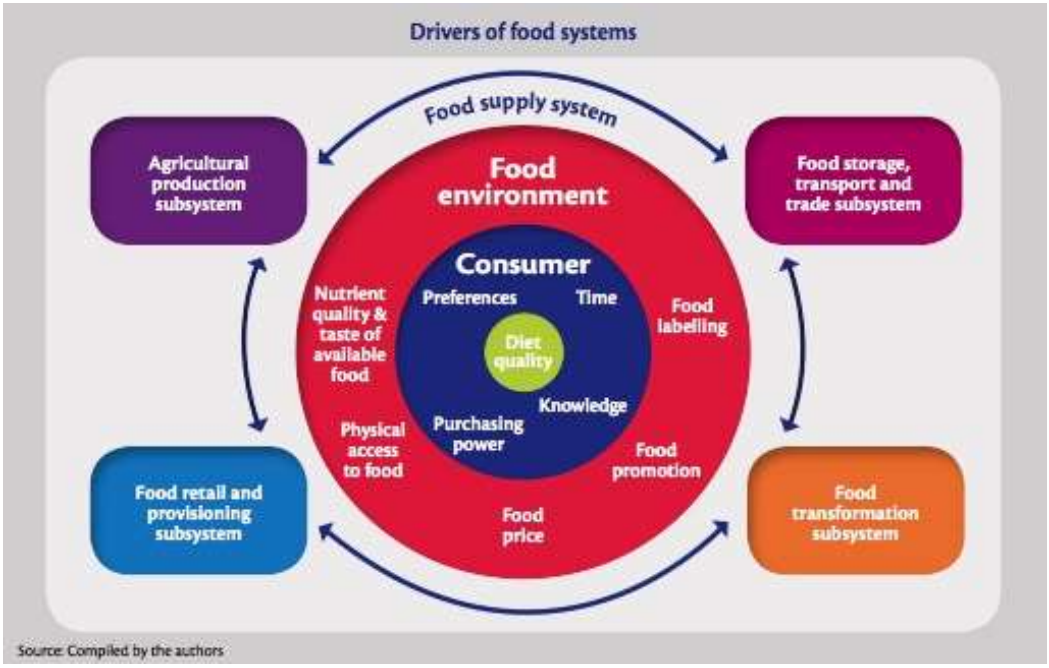


Figure 8. Conceptual framework linking diet quality and food systems (Haddad *et al*., 2016, p.82).

There are many ways of representing the food system. Another simplified model is represented in the 'Vermont Farm To Plate Strategic Plan' (Vermont Strategic Jobs Fund, 2013). It illustrates the food system as being broadly categorised into farm inputs, production, processing, wholesale distribution, retail distribution, consumer demand, nutrient management and support organisations, for example government, Non-Governmental Organisations (NGOs), academics, funders and trade associations (see Figure 9):

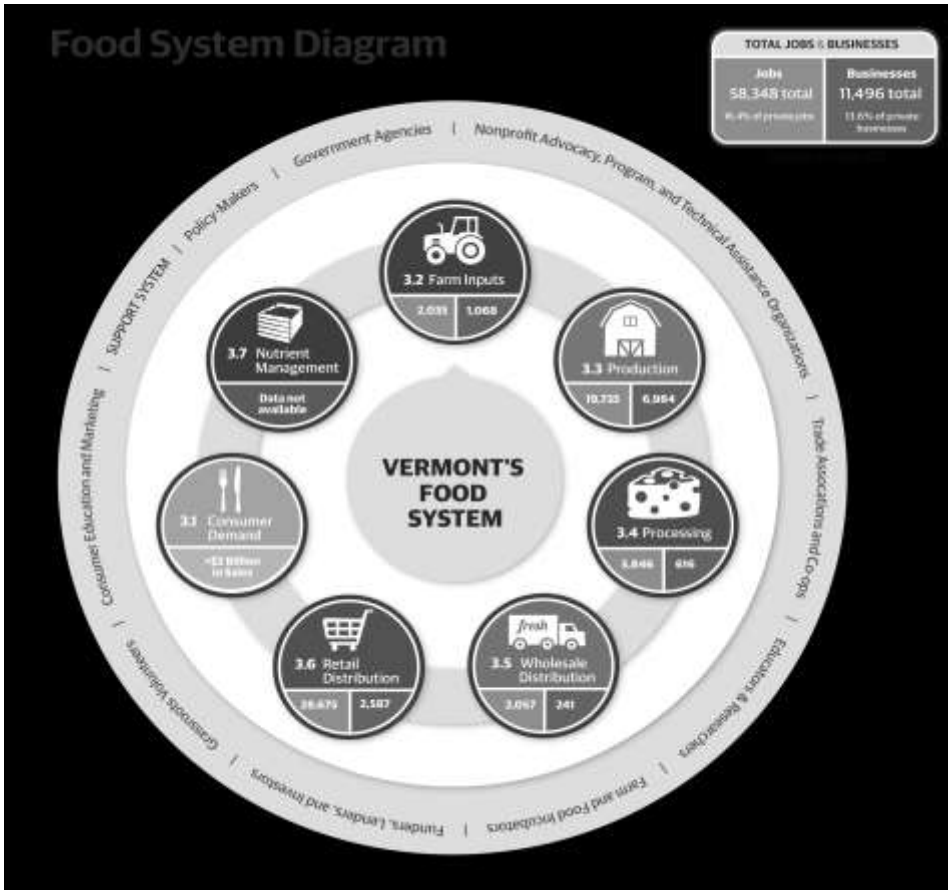


Figure 9. Vermont's Food System (Vermont Strategic Jobs Fund, 2013, p.8).

Although this is an over-simplified illustration it offers a useful symbolic tool for explaining the food system. Food system approaches have, however, been criticised by some agri-food researchers for representing the food system as if it were an object, rather than drawing attention to its characteristics as a network of relationships and practices (Arce and Marsden, 1993). Moragues-Faus, Sonnino and Marsden (2017, p.184) also argue that:

> "Studies on vulnerabilities and drivers in the food system have largely failed to address holistic but also the competing interpretations of food security. In general, they tend to focus on specific sectors and dimensions of the food system as well as on outcomes, rather than unpacking root causes of vulnerability."

Food system models may be a useful starting point if they help food system stakeholders conceptualise how food system activities are related and how actions and policies may converge to achieve food security and sustainability outcomes. That is to say, provided that they are used in conjunction with an understanding of ecology, politics, and power, and how these may affect food systems. This highlights

the need to also consider conceptual tools such as political economy and political ecology.

2.6.3 Political economy, political ecology and place-based approaches

Political economy is a term generally used to describe interdisciplinary studies which draw upon economics, sociology and political science to explain how political institutions, the political environment, and the economic system influence each other (Weingast and Wittman, 2008). The literature review started with a broad description of the main food system being dominated by economism and the emergence of alternatives defining themselves in opposition to that, but through a political economy approach we see, just like with the food systems approach, that the situation is likely to be more nuanced and inter-connected than this. A more nuanced understanding of economy, outlined by the political economist Gibson-Graham (2006), is the diverse economies framework. This framework attempts to move us beyond the conception of a binary opposition between dominant capitalist economy framing and an alternative. Instead it suggests that stakeholders engage in a range of different economic activities within an economy, including ethical action; for example, volunteering time to cook for others. They argue that economies are not just a place of submission to 'the bottom line' or the 'imperatives of capital' as often portrayed (Gibson-Graham and Roelvink, 2011):

Transactions	**Labour**	**Enterprise**
Market	Wage	Capitalist
Alternative market	Alternative paid	Alternative capitalist
Non-market	Unpaid	Non-capitalist

Figure 10. The diverse economy adapted from Gibson-Graham (2006, p.72).

A reason for conceptualising the economy along the lines of the diverse economies framework is that it helps facilitate relational and convergent thinking. In terms of the food system, it suggests that stakeholders within the system are likely to be operating within many different economic spheres. This suggests there may be opportunities to

explore how food system activities are related and how stakeholders can explore common ground for a better food future.

According to Moragues-Faus and Marsden (2017, p.277) political ecology has modified aspects of political economy “for example by including more complex state-civil society-market interactions underpinned by a broader notion of politics”. Robbins (2012, p.20) argues that political ecology explores the “condition and change of social/environmental systems, with explicit consideration of relations of power” and that it “explores these social and environmental changes with an understanding that there are better, less coercive, less exploitative, more sustainable ways of doing things” and that, since its emergence in the 1980s, agriculture has been an important area of enquiry. As summarised by Perreault *et al.* (2015) political ecology comprises three key elements: critical social theory and rejection of positivist approach, multi in-depth direct observation to understand place-based and socio-ecological relations, and an assumed political commitment to research for the purpose of enhanced social justice and structural political change. There is a synergy between the political ecology approach and the approach adopted for this research as discussed in more detail in Chapter 3 (Methodology) and Chapter 7 (Discussion).

Concentrating on place helps transcend some of the complexities of food system dynamics by establishing a specific context within which decisions are made (Sonnino, Marsden and Moragues- Faus, 2016). It also enables stakeholders to come together on a common platform to problem-solve. Some argue that political ecology and place-based approaches are a good entry point and completely necessary to the development of sustainable food systems as they help to explain some of the politics and power dimensions involved (Marsden, 2012, Moragues-Faus and Marsden, 2017). “Linking place-specific conditions to different scales and processes” is one of the key tools of political ecology (Moragues-Faus and Marsden, 2017, p.278) and Neumann (2009, p.398) states “key theoretical concepts in human geography – such as place, region, and scale – have long been integral to political ecologists’ analyses of human-environment relations”.

Place-based approaches have been popularised by human geographers like Massey (2005) who contends that geography, and more precisely space, is a dimension of multiplicity which allows us to consider different aspects that exist simultaneously

within a space. The lens of space and place in the social sciences presents us with the existence of others and prompts us to think of ways in which we can work together. Hence the lens of space is a useful tool for exploring relationality. Morgan *et al.* (2006b, p.8) suggest that food is particularly constrained by nature and culture and so food chains never fully escape ecology and culture of place like other commodities do. The prominence of place-based approaches in relation to food has risen in recent years particularly with the emergence of cities as places of decision making (Moragues-Faus and Morgan, 2015). There is a recognition that policies are shaped by specific contexts, relationships between the institutional, political, regulatory, business and civil society and locations (Smith *et al.*, 2016).

Political ecology also looks at power structures. With neoliberalisation, the state has to some extent been 'hollowed out' (Lang, Barling and Caraher, 2001). As Ericksen *et al.* (2010) contend, there has been a shift from state-controlled governing to other forms of governance where the state engages with private actors, such as corporations, sectoral groups such as farmers, and Civil Society Organisations (CSOs) in the development and administration of policy. This, some argue, is the result of a 'revisionist neoliberal retreat to the local' during the 1990s which involved a simultaneous tendency to scale down (for example to devolved and local government), to scale up (to national and global scales) and to scale out (to non-state actors such as CSOs) (de Freitas, Marston and Bakker, 2015, p.241).

Some argue that "the organizational capacity of the state needs to be given far more prominence if one wants to explore the scope for more radical forms of sustainable development" (Ericksen, 2008, p.1247). This is particularly prominent in right to food discourses, which call on the state to ensure food security (De Schutter, 2014a, Salmon, 2013). However, these fail to address how the state can affect change when it may now have limited power to do so. The research for this thesis examines whether solutions to food security and sustainability may be more effectively developed if governance is conceived of as being broadly spread, or polycentric as some describe it (Sonnino, Marsden and Moragues- Faus, 2016); for example, governance shared between state, business and civil society as outlined by Lang (2005):

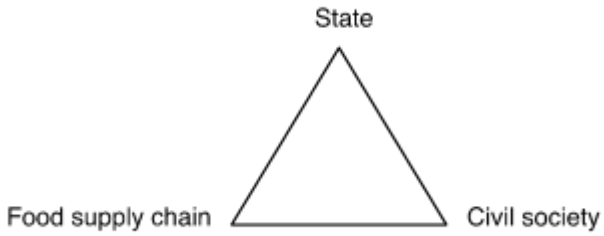


Figure 11. Nutrition as a contested space between state, food supply chain and civil society (Lang, 2005, p.731).

The research for this thesis then is based on a broad toolkit of theories aimed at offering the opportunity to explore convergence across different actors within the food system and whether this can deliver better food outcomes.

2.7 Combining public health nutrition and agri-food research

As Lockie and Kitto (2000, p.1) explain, the term agri-food research has become a shorthand term to describe the "expansion of rural sociological interest, since the 1980s, beyond the farm gate to consider the place of farming in wider systems of food production, processing and supply". According to Lang and Heasman (2004, p.143) agri-food research tended to concentrate on four main areas:

1. "How agrarian structures and state policies developed over time in developing and developed countries and the growth of globalized food regimes;
2. Detailed empirical analyses of particular agricultural commodity regimes, with an emphasis on the structures and strategies of multi-national firms;
3. The role of regulation: how state practices and rules governing food systems are changing and how they shape agri-food systems;
4. How key players and networks of interest work together to formulate policy and define the workings of the food supply chain."

Lang and Heasman criticise agri-food research for rarely acknowledging consumer health as an outcome of the food system. Lockie and Kitto (2000) also suggest that although attempts have been made to incorporate the consumer into agri-food research there is still a division within the field between agricultural sociologists, who focus their attention on the production side of agri-food systems and its impacts on rural areas, and other sociologists who focus on the consumption side such as dietary and food cultures. This division is recognised by others including Morley *et al.*

(2008, p.2) who conceptualise two separate policy paradigms: “a new *public health paradigm*, (which promotes healthy eating as part of a strategy that extols prevention over treatment) and a new *agri-food strategy* (the key aim of which is to move from commodity production to higher value-added activities).”

Public health nutrition, of which Lang and Heasman (2004) advocate the ecological public health nutrition approach, has also been criticised for not being able to address increasing levels of food related ill-health. Carlisle and Hanlon (2014, p.406) argue that “public health nutrition is facing an ingenuity gap: that is, a schism between the quality of the evidence base, the spectrum of problems encountered, and the capacity of current thinking and practice to devise effective solutions” and they call for more integrative forms of thinking and practice. Although, according to Winter (2003) there has been a rediscovery of consumption in agri-food studies others contend that this has largely been on individuals and does not address the broader systemic influencers of the food system (Moragues-Faus and Marsden, 2017).

2.8 Rationale for a food system and food environment change approach

> “Providing advice, or ‘5-a-day’ guidance, is neither working for consumers nor is it resuscitating appropriate horticulture.” (Schoen and Lang, 2016, p.3)

Although there are recommendations for consumption at an individual level and much work has been done to try and encourage individuals to eat more fruit and vegetables in the UK, this has so far failed to increase consumption; in fact it has gone down since the ‘5 a day’ campaign was adopted as public health policy in 2003. In Wales in 2017 only 23% of adults reported eating five or more portions of fruit and vegetables on the previous day (Welsh Government, 2018a) down from 39% in 2003 when the ‘5 a day’ campaign began.

The ‘5 a day’ message has been effectively targeted at consumers through a variety of education programmes, as demonstrated by effective recall in consumer surveys such as Food and You (FSA, 2014) in which 86% of participants correctly responded that the recommended intake for fruit and vegetables was ‘5 a day’. However, the ‘5 a day’ health promotions conducted over the last ten years do not appear to have had an impact on consumption.

Despite the acknowledgement that public health promotions alone have failed to deliver change to diets, the UK Government continue to consider that a consumer oriented approach rather than a broader food system change approach is required: “Government must ensure that innovative local approaches are disseminated to enable far greater numbers of councils, supermarkets and local NHS bodies to develop more effective means of targeting messages” (Environment Food and Rural Affairs Committee, 2015, p.11). This stance makes it important for other parties such as Civil Society Organisations, businesses and public health researchers to look at other effective solutions broader than consumption strategies that encompass production, supply chain and food environment.

This thesis explores the idea that the reason the ‘5 a day’ campaign has so far been unsuccessful is that the message has been targeted at one point of the system only. Meanwhile much of the rest of the system has been on a different trajectory, increasing the relative availability of high fat, salt and sugar foods compared to fruit and vegetables, creating what some now term a “food swamp” (Bridle-Fitzpatrick, 2015).

The underlying assumption of education programmes is that people make optimal use of available information and make choices and purchases that optimise their well-being as a result (Produce for Better Health Foundation, 2012). However, consumer behaviour theory, based on behavioural economics and psychology, argues that decision-making is often systematically non-rational and that the autonomic nervous system guides many consumption ‘decisions’ (Wansink, 2006) making food environments key to consumption.

It has been widely claimed that the food environment is often an obesogenic environment, with the term ‘food swamp’ replacing ‘food desert’ (Manning, 2016). In relation to the increase in obesity levels across all age groups since the 1970s in the US, Anthony *et al.* (2018, p.e162) argue that “it is implausible that each age, sex and ethnic group, with massive differences in life experience and attitudes, had a simultaneous decline in willpower related to healthy nutrition or exercise”. Many argue, like Haddad *et al.* (2016, p.16) that “today’s food systems are too focused on food quantity and not enough on quality. They are not helping consumers to make healthy and affordable food choices consistent with optimal nutrition outcomes”.

Although the food environment theory has been criticised (Guthman, 2011) and other factors to do with lifestyle, such as work schedules, time constraints, prices, personal mobility, safety, product quality and variety, perceptions of customer service and other shop characteristics, familiarity and habit are also likely to influence consumption (Bridle-Fitzpatrick, 2015), there is reason to propose that part of the answer might lie in food system approaches which increase accessibility and availability of fruit and vegetables within the food environment. In Europe, a systematic review of 42 research studies found limited evidence that education interventions can improve dietary intake in children, limited evidence that environmental interventions can boost fruit and vegetable intake, but strong evidence that multi-component interventions, including both education and changes to the food environment, increase fruit and vegetable intakes (Van Cauwenberghe *et al.*, 2010, Hawkes, 2013). The House of Commons Health Committee (2015, p.18) concluded in their 'Impact of physical activity and diet on health' report:

> "It is clear from the evidence we have heard that interventions focused on encouraging individuals to change their behaviour with regard to diet and physical activity need to be underpinned by broader, population-level interventions."

There is growing consensus that educational programmes alone have not led, and will not lead, to a large and sustained increase in fruit and vegetable consumption, and that actions are most effective when they involve multiple components (Hawkes, 2013, Manning, 2016, House of Commons Health Committee, 2015). However, there is a need for more evidence on how food systems can deliver better nutrition outcomes (Berti, Krasevec and FitzGerald, 2003, Dangour *et al.*, 2012, Hawkes and Halliday, 2017). Hendry *et al.* (2013, p.1) found in their review of published research "no studies assessing environments or enabling healthier choices through food distribution or retail" and they specifically called for more UK peer reviewed research on enabling food environments.

2.9 Combining production and place of consumption

Trauger & Passidomo (2012, p.299) comment that "the place of production and the place of consumption are critical elements of sustainable systems and the disconnection between these places is a source of inherent instability and non-sustainability". Bridging the divide between production and consumption research is

seen as a potentially useful tool to address some of these problems and for greater food security and sustainability. For instance, in their analysis of what they term 'food system lock-in' (when unsustainable activities continue regardless of the damaging effects) in relation to fertiliser use in Finland, Kuokkanen *et al.* (2017) suggest that a way of unlocking the problem might lie in new food system policies that bridge production and consumption. Adams (2015, p.31) also argues that the division:

> "whilst necessary at some levels of analysis, poses a significant challenge towards developing a broader theoretical and conceptual understanding of a sustainable agri-food system. This will require an appreciation of the symbiotic link between these two spheres and how governance can assist in forging sustainable linkages between them"

Moragues-Faus and Marsden (2017, p.280) suggest this is another 'missing middle' in agri-food research:

> "On the thematic front, there is a need to address further the processes between production/consumption spheres as well as the interactions between different – and in many cases hybrid – constituencies such as the role of the State or the different forms of private actors."

How to actually link production and consumption is less well articulated in the literature. Though Sonnino *et al.* (2016, p.477) argue that:

> "efforts to refine the food security agenda should start with a recognition of place as key and active meso-level mediator – that is, as a progressive canvass for reassembling resources around more effective food production–consumption relations and as a multi-scalar theoretical lens that offers the conceptual advantage of building far more complexity and diversity into aggregated food security debates."

This research attempts to bring food production or agri-food studies and consumption or public health nutrition together to explore whether the approach offers potential to the development of more secure and sustainable food systems. It attempts to do this by looking at one aspect of food security, that is fruit and vegetable consumption and production. Consumption and production are considered as embedded in place (Morgan, Marsden and Murdoch, 2006a) and the starting point for this research uses Wales as a frame. The research explores the fruit and vegetable requirement of the Welsh population by scaling up public health recommendations to a population level.

This is used as a food system planning tool to explore policy and action options for greater food security and sustainability with divergent fruit and vegetable supply chain stakeholders in Wales and the UK.

This approach echoes the community food security approach but in this case the boundary for the community of research is set to Wales. It helps to fill a gap in research around linking production and consumption and food system orientated research in the UK. As Schoen and Lang (2016, p.3) note, there has been a particular gap in research around fruit and vegetable production and consumption:

> "What is even more alarming is the lack of UK research into what could happen to farming, the food economy and trade, if consumers were to take on board current advice and en masse increase their fruit and vegetable intake"

and:

> "Modelling work to investigate how the UK could meet an increased domestic demand is recommended. The paper also calls for a policy review into how the British could both grow and consume more of their own horticultural production."

Morgan (2008) also notes in relation to Wales, that there has been no attempt, advocated in current Welsh food policy, to examine the food needs of the population and no public planning of demand and supply. This research seeks to fill a gap in the research, at least in terms fruit and vegetables, by attempting to explore whether linking production of place to food consumption requirements of the people of place, acts as a useful tool for improving food security and identifying potential solutions for more sustainable food production and consumption. It explores whether it offers a platform on which stakeholders from different paradigms can come together (convergence) and whether this could be transformative. The next part of the chapter explores the rationale for choosing Wales and fruit and vegetables as the place and food to link production and consumption.

2.10 Why Wales?

Although some papers contend that Wales has high levels of food security (National Assembly for Wales, 2011), there is also evidence that Wales has high levels of malnourishment and associated dietary ill health, inequality and environmental issues. This has led other papers to question the notion that Wales has high levels of food security: "[the] environmental, health, and social impacts of our food system

have become increasingly evident and concerns about the security of our food supply have grown" (Welsh Assembly Government, 2010a, p.5) and "the system is also vulnerable to a wide range of potential threats such as interruptions in energy supplies, extreme weather events, global pandemics, and economic disruption" (Welsh Assembly Government, 2010a, p.18).

A report entitled the 'Welsh Doughnut' encompassing environmental planetary boundaries (as originally articulated by Rockström *et al.* (2009)) and social justice measures (as advocated by Raworth (2012)) found that Wales significantly outstrips proposed boundaries in nearly all of the environmental domains identified; for example, by 55% in terms of biodiversity loss (measured via decline in farmland birds) and 410% in terms of climate change (measured by emission of $MtCO_2$ per year) (Sayer, 2015). In terms of social inequality the proportion of households living in income poverty in Wales has fallen over the last 20 years but remains at 23%: higher than in England, Scotland and Northern Ireland (Joseph Rountree Foundation, 2018). According to the Wales Index of Multiple Deprivation there are particular areas of high relative deprivation in the South Wales valleys and large cities, and in some North Wales coastal and border towns (Welsh Government, 2014c).

In terms of health there are also causes for concern. In Wales, 59% of adults are classified as overweight or obese, of whom 24% are classified as obese (Welsh Government, 2017a). This puts the prevalence of obesity in the Welsh population amongst the highest in Europe. Data from 'The Child Measurement Programme for Wales' which measures the weight of the majority (94.1% in 2016/17) of four to five year olds annually shows that 27.1% of children in Wales are overweight or obese, compared to 22.6% in England in this age group (Public Health Wales NHS Trust, 2018). The levels over the last five years have not changed significantly but the gap between obesity prevalence in the most and least deprived quintiles has increased from 4.7% last year to 6.2% in 2016/17. The local authority area with the highest prevalence of obesity is Merthyr Tydfil (in the South Wales valleys) where 17.5% of children are obese. This is more than double that of the local authority area with the lowest prevalence (Public Health Wales NHS Trust, 2018) and likely to be linked to lower levels of income[9].

9 Links between fruit and vegetable consumption and income are discussed in more detail in section 2.12 of this chapter.

The number of people in Wales reporting being treated for diabetes has increased from 5% to 7% since 2005 (Welsh Government, 2017a). As outlined earlier in the literature review, this affects quality of life and morbidity. It is estimated that in Wales, between £1.4 million and £1.65 million is spent every week treating diseases resulting from obesity (Welsh Government, 2017a). Meanwhile “most Welsh produced food is exported and most food eaten in Wales is imported and distributed through the supermarket system, there is little integration and association between the two at present” (Welsh Assembly Government, 2010a, p.67). The major agricultural products of Wales are dairy products, eggs, cereals and meat.

The importance of looking at future sustainability solutions in Wales is particularly poignant due to Wales’s special commitment in law to Sustainable Development (Welsh Assembly Government, 2009). In Welsh law it has been defined along the lines of the 1987 Brundtland report definition; sustainable development “meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987, p.15). This creates an added commitment, at a state level, to act to achieve sustainability. This was further developed, during the research phase of this thesis, by the introduction of the Well-being of Future Generations Act 2015 (Welsh Government, 2015b), to improve the social, economic, environmental and cultural well-being of Wales. It puts in place seven well-being goals for Wales, for a more equal, prosperous, resilient, healthier and globally responsible Wales, with cohesive communities and a vibrant culture and thriving Welsh language. All public bodies must consider this Act in decision making. Under section (10)(1) of the Act, the Welsh Ministers must publish indicators that must be applied for the purpose of measuring progress towards the achievement of the well-being goals (Welsh Government, 2015b). There is therefore, not only a public health and moral incentive in Wales to address food security and sustainability issues but also a legal one.

2.11 Why fruit and vegetables? ‘5 a day’ public health campaign

The World Health Organization (WHO, 2013) estimates that approximately 1.7 million (2.8%) deaths per annum worldwide are linked to low fruit and vegetable consumption. Fruit and vegetables are important sources of vitamins, minerals, trace elements, phytochemicals and dietary fibre. Most varieties also contain a high

proportion of water and are therefore low in calories. Dietary patterns with high proportions of fruit and vegetables imply that other, physiologically less beneficial foods are consumed less often. This may help to reduce weight gain (Boeing *et al.*, 2012) though there is limited evidence for this. Fruit and vegetables are recognised by public health nutritionists as being a key marker of high quality diets (Haddad *et al.*, 2016).

Where the '5 a day' campaign originated is debated. It is known that the World Health Organisation adopted 400g a day as a lower limit for fruit and vegetable consumption as one of its worldwide population nutrient goals in 1990 (WHO, 1990, p.112). Originally the 400g recommendation was introduced to attempt to reduce the incidence of cancer, and increase vitamin A and dietary Iron availability (aided by increased Vitamin A and C intake) (WHO, 1990). This recommendation was a 'judgemental' one, not specifically based on the epidemiological evidence, but on what was perceived to be achievable, and as a result has been criticised (Harcombe, 2014).

To some degree the criticism is warranted, with later epidemiological evidence indicating that the link between fruit and vegetable intake and reduced cancer risk is less clear (Leenders *et al.*, 2013, Boffetta *et al.*, 2010). An international review of diet and cancer in 2007 found that the evidence that fruit and vegetable consumption prevented cancer was 'probable' for only cancers of the mouth, pharynx, oesophagus, stomach and lung (World Cancer Research Fund/American Institute for Cancer Research, 2007). However, evidence from meta analyses has reinforced that increased consumption of fruit and vegetables has protective effects against the risk of coronary heart disease (He *et al.*, 2007, Dauchet *et al.*, 2006), stroke (He, Nowson and MacGregor, 2006), cardiovascular mortality and all-cause mortality (Leenders *et al.*, 2013, Wang *et al.*, 2014, Nguyen *et al.*, 2016). At a UK level, analysis of Health Survey of England data (2001-2008) also found that fruit and vegetable intake, up to 7+ portions a day, is associated with decreased all-cause mortality as well as reduced cancer and cardiovascular disease mortality (Oyebode *et al.*, 2014). Vegetables may be more protective than fruit (Oyebode *et al.*, 2014) and this needs further investigation with implications for public health nutrition policy and this research.

There is also some evidence that consuming fruit and vegetables may positively affect mood and mental health; although in relation to depression, the question of whether low fruit and vegetable consumption is a predictor or a result of depression is debatable. A meta-analysis of ten studies, involving 227,852 participants for fruit intake and eight studies involving 218,699 participants for vegetable intake, indicated that fruit and vegetable consumption might be inversely associated with the risk of depression (Lui *et al.*, 2016). Another longitudinal study of 12,385 randomly sampled Australian adults found increased fruit and vegetable consumption was predictive of increased happiness, life satisfaction, and well-being (Mujcic and J Oswald, 2016).

The '5 a day' (5 x 80g servings of fruit and vegetables) slogan was probably first coined by the 'National five-a-day for better health program' in 1991 (WHO, 2003). It was a collaboration between the National Cancer Institute (NCI) and the Produce for Better Health Foundation to increase fruit and veg consumption and sales in the USA and to attempt to decrease the incidence of cancer.

Regardless of the lack of original evidence, the '5 a day' slogan has been adopted and adapted by official and unofficial health promotion bodies across the world (see Figure 12):

	Country	Title
Sub-Saharan Africa	South Africa:	Five a Day for Better Health Trust
Near East (incl North Africa)		
Latin Amer ica & Caribbean	Argentina	5 al día
	Brazil	5 ao dia
	Chile	5 al día
	Mexico	5*Dia
Asia & Pacific	Australia:	Go for 2&5®
	Western Australia	
	New Zealand:	The 5+ A Day Charitable Trust
North America	Canada	Fruits and Veggies - Mix it up!™:
	United States	5 a Day for Better Health & Fruits & Veggies More Matters & United Fresh Produce Association
Europe	Denmark:	6 a day
	Finland	Half a kilo a day
	France	10 a day
	Germany	5 am Tag
	Spain	5 al día
	UK	5 a day

Source: IFAVA, 2012

Figure 12. Examples of '5 a day' campaigns, from Hawkes (2013, p.13).

The UK Government adopted the '5 a day' campaign in 2003[10]. The guideline, as it appeared in the summary of recommendations in the Nutritional Wellbeing of the British Population report (SACN, 2008) and adjusted with recent changes by Public Health England, is listed in Figure 13:

Food	Recommendations Dietary Reference Values/ Food Standard Agency (FSA)	Population group	Reason for recommendation
Fruit and vegetables	At least 5 x 80g portions/day (400g) Includes fresh, frozen, dried and tinned fruit and veg, and those cooked as part of other dishes. Juice up to 150 ml included as well as one portion of pulses/ beans. Does not include potatoes.	11 years +	Reduce risk of some cancers, cardiovascular disease and many other chronic conditions

Figure 13. '5 a day' recommendation adapted from the Nutritional Wellbeing of the British Population report (SACN, 2008, PHE, 2016a).

By the end of the research period, '5 a day' had become *at least* five portions, with the Eatwell Guide based on 554g or '7 a day' (PHE, 2016a). This had implications for the research which are explored in Chapter 4 (Requirement).

The '5 a day' campaign has been adopted by numerous public health promotion bodies, the Department for Health 'Change 4 Life' campaign (Change 4 Life Wales, 2017) , the Public Health England 'Eat Well' guide (PHE, 2016a) (adopted in Wales) and local government who actively promote healthy eating to help fulfil their public health duties (Environment Food and Rural Affairs Committee, 2015). In Wales it has

[10] Evidence gathered from the fresh produce industry, as part of this research, suggested that the UK industry was using the '5 a day' campaign prior to UK Government adopting it as official policy in 2003.

also been encompassed into Health Challenge Wales (Public Health Wales, 2017), the Nutrition Skills for Life Programme, the Welsh Network of Healthy Schools (from 1999) and the Childhood Obesity Strategy (Welsh Government, 2015a).

2.12 Fruit and vegetable consumption trends

Despite UK and worldwide public health promotions of fruit and vegetables, consumption remains below recommendations for health. A study of 196,373 adult participants from 52 countries found 77.6% of men and 78.4% of women consumed less than the minimum recommended five daily servings of fruit and vegetables (Del Gobbo *et al.*, 2015, Hall *et al.*, 2009). According to Haddad *et al.* (2016) Eastern Asia, comprising mainly China, Japan and South Korea, is the only region in the World to have average consumption figures for fruit and vegetables above the WHO recommendation of 400g per day.

Although self-reported intakes are known to be inaccurate, according to the most up-to-date statistics available, from 2014/15–2015/16, from the UK National Diet and Nutrition Survey, UK adults aged 19 to 64 years report consuming on average 4.2 portions per day, 3.7 in Wales, and children aged 11–18 years 2.7 portions per day (Wales and England) (PHE, 2018). According to Wales specific updated data from 2009/10–2012/13, 78% of adults aged 19 to 64 years, 77% of adults aged over 65 years and 94% of children aged 11 to 18 years do not meet the ‘5 a day’ recommendation (Bates *et al.*, 2018).

Consumption of fruit and vegetables is likely to be less than self-reported accounts and varies regionally. Family Food Survey data, which is based on purchases of fruit and vegetables, put purchases in Wales at 3.5 portions in 2014 (Defra, 2016b), the same as Scotland and Northern Ireland but lower than areas of Southern England:

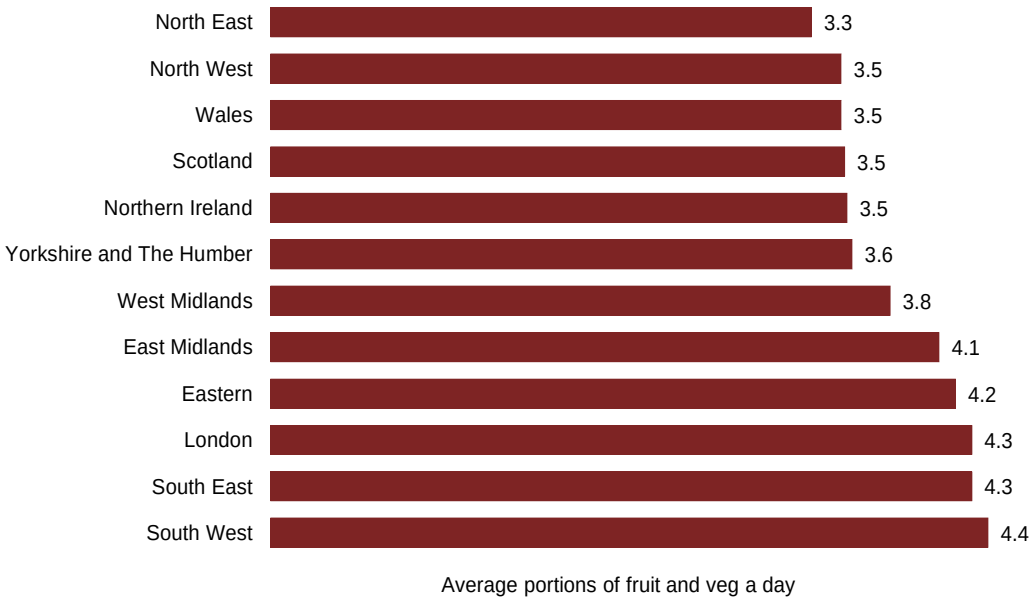


Figure 14. UK Regional household consumption of fruit and vegetables 2012-2014 (Defra, 2016b, p.50).

These figures do not include the amount of fruit and vegetables wasted at a household level. Waste estimates vary between products and reports, from 22% of edible fruit and vegetables (Defra, 2016b, p.42) to 39.3% fresh fruit wasted of which 19.3% is unavoidable and 45.9% vegetables wasted of which 6.1% is unavoidable and 19.1% possibly unavoidable (WRAP, 2014). Combining the purchasing and wastage figures from different reports reduces likely UK consumption to 3 a day or of 241g per day per person (Manning, 2016).

Consumption varies widely between age and income. On average, teenagers eat less fruit and vegetables than adults. There is some evidence to suggest that 11–16 year olds in Wales have the lowest intake of fruit and vegetables in the UK (Public Health Wales Observatory, 2013). Data consistently shows that people on lower incomes purchase less fruit and vegetables than those on higher incomes (see Figure 15):

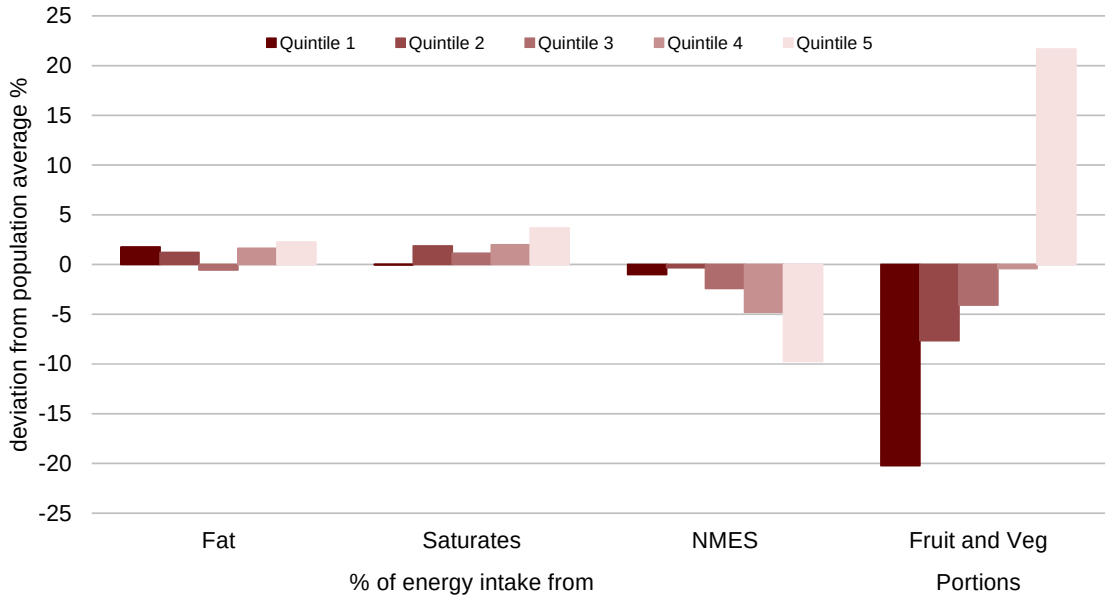


Figure 15. UK dietary indicators by equivalised income (Defra, 2016b, p.48).

This is a pattern that is reported to be seen worldwide, with lower income countries as well as lower income groups within countries having lower fruit and vegetable consumption (Miller *et al.*, 2016). It has also been found that consumption of fruit and vegetables is likely to decrease as the relative cost increases. Low-income households in the UK, from 2007–2014, decreased their purchases of fresh and processed vegetables by 6.56% and fruit by 11% (Defra, 2016b). A systematic review of 151 international studies has found that the higher cost of healthy diets may explain some of the socioeconomic disparities in diet quality (Darmon and Drewnowski, 2015).

Fruit and vegetable consumption seems then to be a particular marker of inequality and potentially a propagator given that low consumption increases morbidity and mortality.

2.12.1 Fruit and vegetable production trends

UK and Wales fruit and vegetable production has gone down over time. In the UK from 1985 to 2014, there was a decline of 27% in land area growing fruit and vegetables, though there have been improvements in yield meaning that tonnage has not decreased as substantially (Schoen and Lang, 2016). Home production of vegetables is now at 57% of total supply and fruit just 16% (Defra, 2018b). The trade

deficit for the UK, the difference between how much is exported to imported, for fruit and vegetables is the highest of all food groups.

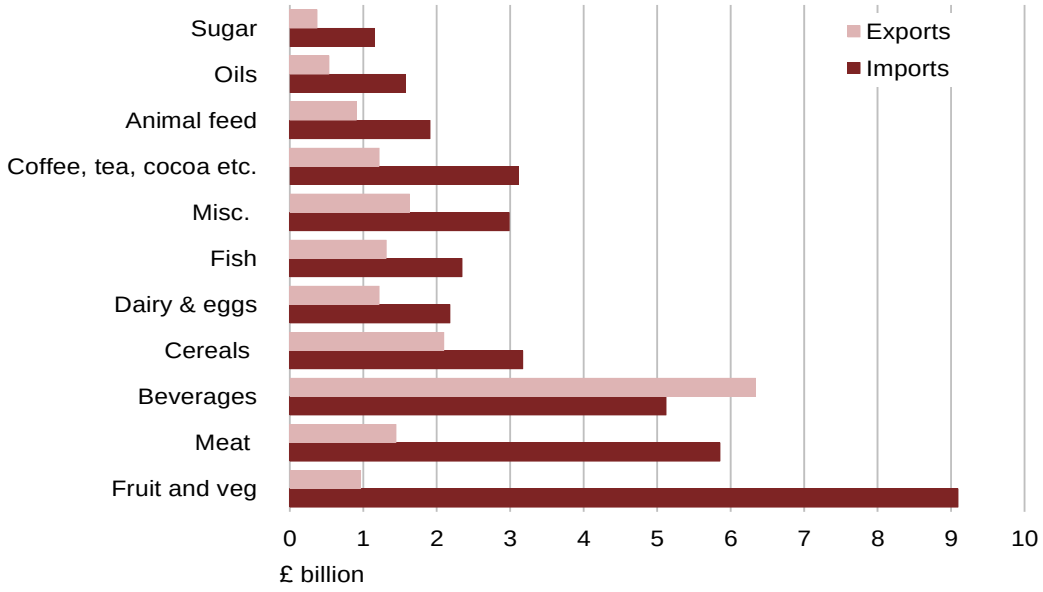


Figure 16. UK Trade Deficit in Different Food Groups 2015 (Defra, 2016b, p.25).

Compared with other parts of the UK, Wales has the smallest percentage of arable and horticultural land. However according to 'Working Futures 2012–2022' (UKCES, 2014), 28,320 people are employed in horticulture in Wales (out of 1.4 million) compared to 302,935 employed in England, and 403,266 employed across the UK. This represents 7% of total UK horticultural labour and contrasts with the lower amount of 1% of total UK horticultural land area in Wales indicating a higher proportion of jobs per hectare in Wales than in England, for instance, which has 96% of the horticultural land and only 75% of the labour (Schoen and Lang, 2016). This is probably a reflection of the smaller average size of farms in Wales.

Wales is formed from an exposed mountainous region over 600m in the northwest of the country and an upland area of acidic moorland between 200 and 600m, with a coastal strip of flatter but still undulating land and river valleys. This consists of the Vale of Glamorgan, Monmouthshire, the Welsh Marches, Flintshire and Denbighshire, the coastal plain of North Wales, the island of Anglesey, the coastal plain on Cardigan Bay and Pembrokeshire; and these are the main arable and horticultural cropping areas. The mild Atlantic climate with predominantly westerly winds give the country a high rainfall (Collins and Thirsk, 2000). The dairy industry is

well-developed in more favourable parts of the country; livestock is raised in the upland areas, with the mountainous areas being used extensively for sheep farming. Approximately 84% of the land area is used for agriculture; greater than the other UK countries. Land use is dominated by permanent pasture grassland, which accounts for more than 75% of the utilised area, followed by 14% for croppable and 10% for common rough grazing (Armstrong, 2016). The average size of farms in Wales is 48 hectares; or 98 hectares for all farms over 20 hectares (Defra, 2017a).

The majority of land in Wales grows grass, and this has been the case since agricultural statistics began around 1867. However, the relative proportion of crops has generally reduced over the last 150 years. In 1867 there were around 300,000 hectares of land growing crops, and in 2004 this figure was less than 100,000. There were two reversals of this trend during the two World Wars when land allocated to crops increased significantly; but then levels returned to pre-war or lower levels (see Figure 17):

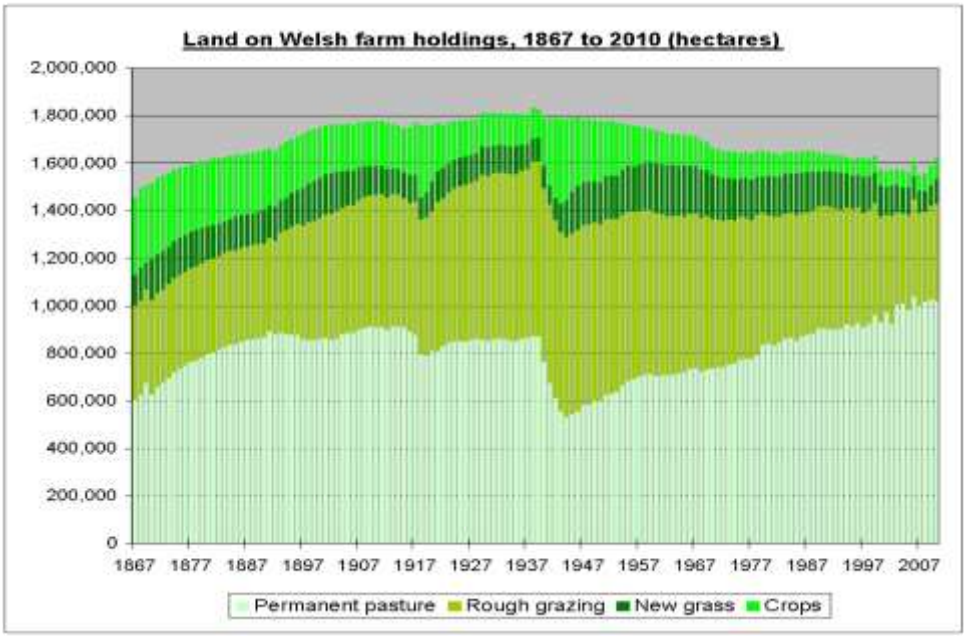


Figure 17. Land on Welsh Farm Holdings. Results from the Welsh Agricultural Survey at June each year 1967-2007 (Excludes common land) (Welsh Assembly Government, 2010b, p.8).

Crops, as defined above, include cereals and stock feed as well as horticulture for human consumption. Only a small amount of this crop land grows fruit and vegetables, and according to Frost *et al.* (2007) this has also reduced over time:

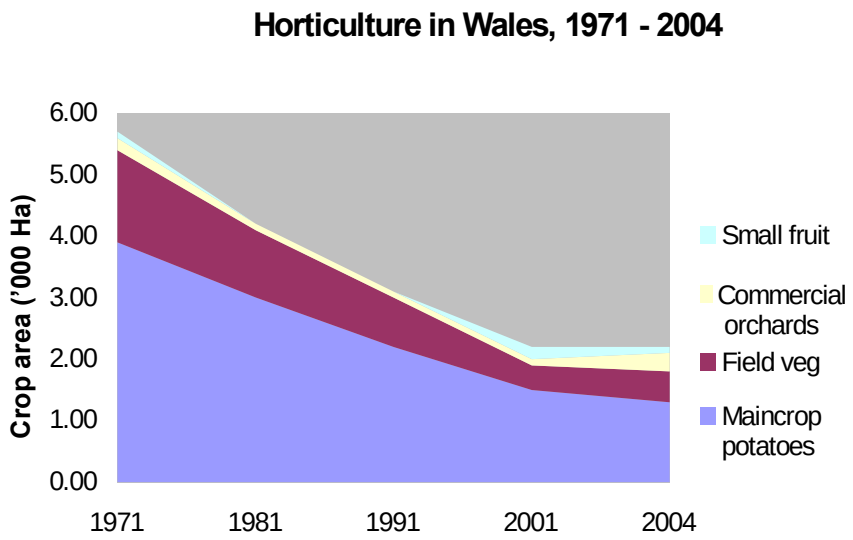


Figure 18. Horticultural trends in Wales, 1971–2004 (Frost *et al.*, 2007, p.10).

Using statistics published on Wales Agriculture output (Welsh Assembly Government, 2010b, Welsh Government, 2014b, Welsh Government, 2015c, Welsh Government, 2016) it is estimated that in 1971 there were just over 2000 hectares growing fruit and vegetables, this gradually reduced until 2008 when it was at a low of around 1000 hectares before recovering to around 1600 hectares by 2015 (see Figure 19):

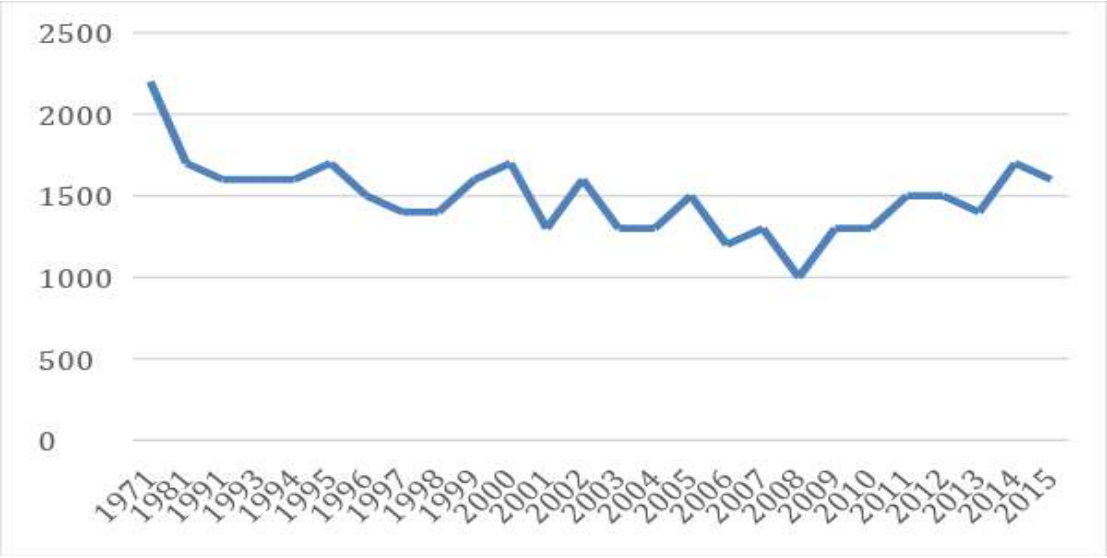


Figure 19. Wales horticulture output (excluding mushrooms) in hectares, 1971–2015.

Historically then, fruit and vegetable production in the UK and Wales is hovering around an all-time low, at least according to land allocation figures; although this not a complete reflection of production as it does not take into account increases in yield. We know that there is capacity to grow more, as shown by the historical precedent, but also as indicated by the outdated but still utilised Agricultural Land Classification system which shows that although 80% of land is Grade 4–5 (less favourable area), 20% (345,839 hectares) is classed as Grade 1, 2, 3a and 3b, excellent, good, good to moderate and moderate quality (see Figure 20):

Agricultural land classification (ALC): areas of grades in Wales. Grade 1: excellent, Grade 2: very good, Grade 3: good to moderate, Grade 4: poor, Grade 5: very poor. Source: Land and Water Service Technical Notes TN/RP/01 TFS 846 (February 1983)

Grade	% of agricultural land	% of total land	ha
Grade 1	0.2	0.2	4,142
Grade 2	2.3	1.9	39,347
Grade 3	17.5	14.6	302,350
Grade 4	44.2	36.8	762,087
Grade 5	35.8	29.8	617,125
Non agricultural		4.2	86,977
Urban		12.5	258,861
Total	100	100	2,070,888

Figure 20. Agricultural Land Classification from Plassman and Edwards-Jones (2007, p.82).

Grades 1–3a are described as the ‘Best and Most Versatile’ agricultural land (Welsh Government, 2016) and cover 7% of the land in Wales (121,044 hectares). Yet fruit and vegetables are only grown on 1,628 hectares (Welsh Government, 2018b) meaning only 0.5% of Grade 1–3 land or 0.1 % of total agricultural land is producing fruit and vegetables. There is clearly, in terms of land availability, capacity to produce more in Wales.

There is a perception that horticulture and fruit and vegetable production is not something that ‘is done’ in Wales or the UK (see Chapter 5 (Barriers and Enablers)). Certainly, in terms of land, horticulture is a small sector. The area growing fruit and vegetables in the UK (horticulture minus outdoor plants and flowers) is only 150,000 ha (Defra, 2017a, p.16) compared to overall total utilised agricultural area of 17,360,000 this represents around 1% of utilised agricultural land or just 2.5% of

croppable land. Seen in land terms, horticulture is a small sector. However, in terms of financial returns it is a relatively large sector, on a UK level it is a bigger income generator than the pig and lamb sectors. In 2016 the value of vegetables was £1,329 million and fruit £668 million combining to give an output of £1,997 million, more than the value of pig meat (£1,099 million), Lamb meat (£1,153) million and similar to that of poultry (£2,246 million) (Defra, 2017a, p.31). This gives fruit and vegetable production worth £1,997 million on 150,000 ha of land overall an output per unit land of £13,180 per ha. The question is whether it matters that production of fruit and vegetables in Wales is so low; and, if so, whether increasing production could play a part in increasing consumption.

2.13 Research Questions

To summarise, the main question this thesis explores is:

How is greater food security and sustainability best achieved?

This is explored through the prism of how to facilitate change towards increased fruit and vegetable consumption and production in Wales and the UK. Four areas of enquiry, two theoretical, one methodological and one practical, are used to help try and answer the main question. These are:

1. Can convergence lead to change? (Theoretical)

   Specifically, with regards to increasing fruit and vegetable consumption:

   a) Can linking production and consumption of place, through the development of a population fruit and vegetable requirement, lead to new insight and change?

   b) Can bringing people together across ‘alternative’ and ‘mainstream’ ‘divides’ facilitate change?

   c) Can a convergent food system approach to public health nutrition lead to change?

2. What are the barriers and enablers to greater fruit and vegetable production and consumption? (Theoretical)

3. Can Participatory Action Research (PAR) help facilitate change? (Methodological)

4. What practices are required to achieve change in the food system? (Practical)

2.14 Summary

This chapter gave a brief history of the development of the modern food system, the food security narrative, and its links to productionism and neoliberalisation. It then went on to explore the nutrition transition and rising malnutrition alongside the persistence of undernutrition as well as ecological problems associated with the modern food system. It explored suggested solutions often expressed as alternative to the dominant neo-productionist food security approach, such as food sovereignty, the right to food, the livelihood approach, community food security and sustainable diets. This led to the suggestion that answers to increasing food security and sustainability might lie in convergence. A number of theoretical tools were introduced to conceptualise convergence and system change. Amongst these were ecological public health, food system approaches and political ecology. It was suggested that combining public health nutrition and agri-food research might be a useful starting point and that one way this could be done is by linking production to place of consumption. The rationale for adopting a more systemic approach was given, particularly the lack of effectiveness of the individually focused ‘5 a day’ campaign and evidence that multi-component interventions which engage with the food environment, are likely to be more effective. The reason for choosing Wales and fruit and vegetables as an initial focus was outlined, along with declining consumption and production trends, in order to set the context. This was followed by a specific outline of the research questions being addressed in this thesis. The next chapter moves on to discuss the methodology adopted to explore whether convergence of consumption and production in the first instance might facilitate greater food security and sustainability.

3 Methodology

3.1 Chapter overview

This chapter outlines the research methods considered and the rationale for the chosen research approach, Participatory Action Research (PAR). The benefits and drawbacks of the PAR approach are expanded upon, in terms of: participation; exploring issues related to space, place and scale; engagement and power dynamics; and potential for social transformation. Given a reflection on researcher reflexivity and positionality, a justification is given for the adoption of the genre of PAR sometimes called Solidarity Action Research. The benefits of utilising mixed methods in terms of triangulation are touched upon. Discussion then moves on to the exact mixed methodology adopted, utilising secondary data and public health recommendations to calculate the fruit and vegetable requirement, the presentation of a food system approach to stakeholders, visioning, semi-structured interviews, workshops, and participatory engagement. The sampling frame is then explored, and a description of the stakeholders involved in the semi-structured interviews and workshops is provided. Details and challenges of participatory engagement are explored and discussed. Finally, there are some comments on timescale and data analysis, and reflections on ethics and consent.

3.2 Research approach

Quantitative methods, associated with measurement, causality and replication, were ruled out as the main research tool; although some calculations were required to work out the fruit and vegetable requirement of the Welsh population. Qualitative methods were considered most appropriate as they enable more complex and detailed understanding of social issues (Creswell, 2007, p.40). They tend to be empathetic, abductive, descriptive, contextual and flexible (Bryman, 2012, p.709). Qualitative research also tends to be inductive in that the theory is developed throughout the research process, as opposed to being tested, as in more traditional quantitative analysis. This was thought to be particularly important to reflexively explore the dynamics of food system transformation. Criticism of the qualitative approach is that it can quickly generate large amounts of cumbersome data; that it is too subjective, unsystematic, difficult to replicate; and that it lacks transparency

(Bryman, 2012). These criticisms were countered, as much as possible, by following guidelines for quality in qualitative research set out later in the chapter.

Formal language used to describe the particular qualitative approach adopted, as a particular philosophy of knowledge (epistemology), includes ‘post positivist’ and ‘constructivist’ (Wadsworth, 1998, p.11). These represent a challenge to the positivist assumption, historically often adopted by university-based social scientists, that there is an objective social reality that can be measured, analysed and predicted by suitably qualified people (Kindon, Pain and Kesby, 2007a). Rather, they suggest that reality is socially constructed and as such there exists a plurality of realities. These can be accessed by interaction and this process can generate co-constructed research of value because its legitimacy has been tested and stakeholders involved empowered (Lee and Stech, 2011). Because it does not prejudice one reality over another, it offers a useful tool to engage with a range of stakeholders and explore convergence.

A mixed methods approach is recognised as fitting well with researching multidisciplinary topics like food security and sustainability (Franklin and Blyton, 2011) and so for the purpose of this research, a mixed qualitative research methodology was considered appropriate. It also had the benefit of providing triangulation, an approach that uses “multiple observers, theoretical perspectives, sources of data, and methodologies” (Denzin, 1970, p.310). Triangulation attempts to overcome the intrinsic limitations of any one method. It potentially offers greater completeness, enhancement and credibility but is not necessarily better than using a single method (Bryman, 2012).

A range of qualitative approaches were considered, including case study, grounded theory and ethnography, before finally settling on PAR. However, some aspects of these approaches were utilised. A case-study approach was considered and although not adopted formally as the main research approach it could be said that the outcome of the research is a case study of how to try and improve public health nutrition through systemic change, through the lens of fruit and vegetables. Also, aspects of grounded theory, sometimes defined as an approach to the generation of theory, originated by Glaser and Strauss (1967), were considered; and two main features of the approach were utilised: that theory and concepts come during

research (inductive), and that research and analysis happen at the same time (iterative). The grounded theory principle of sample saturation, where the sample is considered sufficient when no new concepts are emerging, was also utilised. The ethnographic approach was considered too. And although aspects of the participatory engagement could be said to be ethnographic, given that the researcher was not only observing but engaging with others on food research and action, PAR was considered the more appropriate umbrella term for the approach.

3.3 Participatory Action Research (PAR)

An introduction, brief history and critical examination of PAR is given in this section, along with a discussion of exact methodologies adopted. Simply described, PAR involves participation in action, research or learning and critical reflection. It involves relevant parties, together, actively examining current action in order to change and improve it (Wadsworth, 1998, p.9). As illustrated below, in Figure 21, it generally involves a collaborative, iterative cycle of research/learning, action and reflection (Newton and Parfitt, 2011) similar to Kolb's (1984) experiential learning cycle:

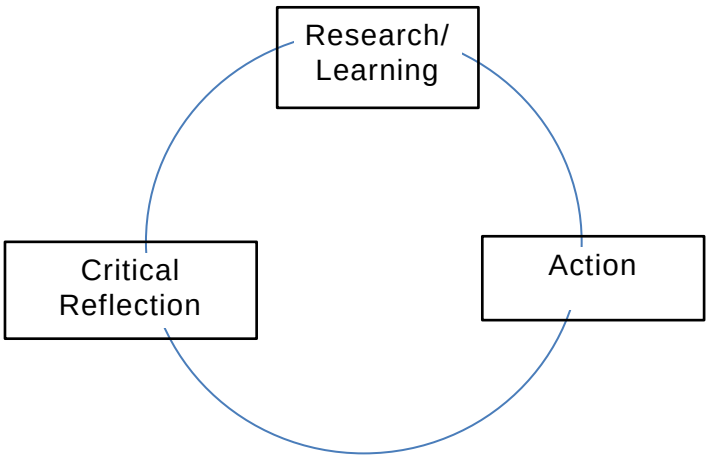


Figure 21. Iterative cycle of Participatory Action Research.

PAR was considered the most appropriate research approach to facilitate collaboration, reduce power imbalances, explore issues of place and scale, and explore transformational potential. Using a PAR process as part of a PhD (by thesis) presents particular challenges (McFarlane and Hansen, 2007). Ultimately

participation cannot extend to all areas of the research as one researcher has to analyse and produce a thesis for examination. This does not however prevent the use of PAR during the rest of the research process. The research for this thesis aimed for maximum levels of participation during workshop design, elements of data collection, reciprocity during the research and learning process, iterative analysis, action and dissemination. The aim was to achieve co-learning, collective action, participation, self-mobilisation, and ultimately, social change. Initially there was some concern that this could not be achieved within the confines of a PhD and it was not always a straightforward process. However, part-time study enabled participatory engagement beyond the more structured interviews and workshops which in turn facilitated action, potential social transformation and greater insight into practice. This is explored in more detail in Chapters 6 (Pease Please) and 7 (Discussion).

Much work on PAR theory and practice emerged from the 'developing world' or disempowered communities in order to counter power imbalances in research and decision making. It has also been linked to feminist perspectives on social inequality and the need for collaborative research approaches (Greenwood, 2004). Use of participatory techniques proliferated in the 1970s particularly by international development institutions. The widespread use of the techniques, and the disconnect sometimes between claims and outcomes, led to criticisms of the emergence of "an increasing number of participatory and action-oriented research projects that are neither participatory nor result in any action" (Stoeker, 2009, p.386).

The strength of critically informed PAR lies in "its ability to facilitate the intersections of theory, practice and politics between participants and researchers in a diversity of contexts" (Kindon, Pain and Kesby, 2007a, p.3). The main principles of PAR, expanded upon in Figure 22, are that it values the process of research and is sensitive to relationships, promotes mutuality, reciprocity and collaboration, values shared experience, recognises plural knowledges, demands an ethics of care, and acknowledges the role of feelings and values (Kindon, Pain and Kesby, 2007a):

Principles of Participatory Action Research

1. Values the process of research: sensitive to shifting relationships, subjectivities, positionalities. (Recognises research relationships as dynamic.)
2. Mutuality, reciprocity and collaboration: promotes working together as equals, both partners gain from the research experience.
3. Values shared learning experience: partners negotiate meaning together.
4. Recognises multiple/plural knowledges.
5. Ethics of care: values research relationship and connectedness-respect for both partners. Recognises that reciprocal work may involve researchers' personal engagement and that the researcher's social milieu impacts upon the research process.
6. Acknowledges the role of feelings, values, attitudes and emotion.

Figure 22. Principles of PAR. Adapted from Kindon, Pain and Kesby (2007a).

PAR has become increasingly accepted as a research approach within academia (Kindon, Pain and Kesby, 2007b, Newton and Parfitt, 2011). Although Pain *et al.* (2007, p.228) maintain it is "still marginalised, side-lined as another empirical approach, as 'practice' rather than 'theory' or as 'community service' rather than research." In PAR is a particular emphasis on reciprocity and collaboration which challenges the power imbalance that has characterised much traditional social science (Newton and Parfitt, 2011). Rather than the extractive process of a researcher doing research on participants the PAR approach encourages researchers to be more akin to facilitators of co-research and action (Wadsworth, 2006). Research is 'with' instead of 'on' with the potential for all involved benefitting (Kindon, Pain and Kesby, 2007a). However some PAR is more participatory than other PAR. Arnstein (1969) outlines a ladder of increasing participant control or benefit, rising from co-option to compliance; consultation and cooperation to co-learning and collective action. Similarly, Pretty *et al.* (1995), outline a continuum of participation starting with passive participation, participation in information giving, participation by consultation, functional participation, participation for material incentives, and finally, interactive participation and self-mobilisation. The research for this thesis made an attempt to fall into the latter interactive participation and self-

mobilisation, the extent to which this was achieved is examined in Chapter 7 (Discussion).

PAR attempts to break down the power imbalances inherent in the researcher–researched model with a commitment to democratic and genuinely non-coercive research (Pretty *et al.*, 1995). Since power imbalances are recognised as being a feature of the current food system, a PAR approach was considered a useful tool to situate stakeholders on an equal platform where they may be able to problem-solve and action-plan regardless of power imbalances. This was also considered important to explore relationality and possible convergence and aspects of food security and sustainability as discussed in the literature review. An awareness of the criticisms of the approach helped to guide its careful use. Some of the criticisms are expanded on here.

Because of its emphasis on consensus and problem solving, and it being a tool often used in community development, some stakeholders, for example NGOs, may be more used to and comfortable with PAR as a process. For those not so familiar with PAR, perhaps those in business, the process may seem alien and hence act to inhibit and marginalise. Cooke and Kothari (2001) in their book 'Participation: The New Tyranny?' consider that there is under-theorisation of power within PAR and a possibility of marginalisation. Kindon, Pain and Kesby (2007b, p.19) attempt to fill this gap by arguing that PAR is a form of power, but suggest that its effects are not only negative: "rather they are messy, entangled, highly variable and contingent". They argue that there can be positive and negative effects of PAR within the same setting, but that does not rule out PAR as a useful tool. Rather researchers need to be mindful and reflective of power in interpreting and relating to theory. Suggested forms of power to be aware of are domination, coercion, inducement, seduction, manipulation and authority (Kindon, Pain and Kesby, 2007a).

Striving for an egalitarian process under PAR may inadvertently align the research to a set of ideologies often associated with the so called 'alternative' paradigm. This may be an issue for the research of this thesis, since it is trying to transcend dichotomies. How this may have influenced the research outcome is explored in Chapter 7 (Discussion).

Although attempts were made to provide a neutral space for discussion during the PAR process, there were power imbalances that influenced the stakeholders. Since power imbalances themselves are an issue of consideration in this thesis, critical reflection of how these may have affected the research outcome added another layer of learning and reflection and ultimately enhanced theoretical understanding; particularly in relation to convergence.

The research of this thesis revolved around linking the food system to public health nutrition outcomes, with an initial focus on combining consumption and production of place. PAR is a tool that is particularly suited to exploring issues of place (Kindon, Pain and Kesby, 2007a). The geographical focus or place in question in this thesis is Wales. Using PAR to consider the consumption requirement of people of Wales against production of Wales aimed to open up a space for deliberation and analysis and possible social transformation. Chatterton, Fuller and Routledge (2007, p.221) contend that "finding and extending places for encounter and solidarity in environments unmediated by consumer relations or profit is one of the most significant challenges of our neoliberal times". Using a participative approach with a public health nutrition lens offered a space to discuss change not explicitly orientated around economism. Focusing on place does not mean that the research findings are confined to the local scale. It may highlight that to effect change requires involving stakeholders at other scales, for example, UK or EU. With greater attention to space and scale, "the local is understood as intimately connected to the global, regional, national, household and personal" (Kindon, Pain and Kesby, 2007a, p.3).

Consideration of the broader political, cultural and ecological aspects of space, place and scale is one of the key methodological aspects of a political ecology approach (Kindon, Pain and Kesby, 2007a). Other common aspects of the political ecology approach, as summarised by Perreault *et al.* (2015) and explained by Moragues-Faus and Marsden (2017, p.277) are:

> "- A theoretical commitment to critical social theory and a rejection to positivist approaches to social relations, understandings of nature and the production of knowledge about it.
>
> - A methodological commitment to in-depth, direct observation that combines different methods to understand place-based and historically constructed socio-ecological relations.

> - A normative political commitment to social justice and structural political change, seeking to conduct research to understand the world in order to change it."

The research for this thesis explores all three of the above points and so could be said to be a type of political ecology. This is examined further in Chapter 7 (Discussion).

PAR is explicitly orientated towards social transformation and change (McTaggart, 1997) and since one of the research focuses was examining the potential of a food system approach to enable action and social transformation, it was considered to be a compatible approach. As Cahill and Torre argue:

> "The challenge for PAR researchers who are serious about social change is to think through how to effectively provoke action by developing research that engages, that reframes social issues theoretically, that nudges those in power, that feeds organising campaigns, and that motivates audiences to change both the way they think and how they act in the world." (Cahill and Torre, 2007, p.205)

Opening up a space for discussion provides opportunities for transformation but it also provides opportunities for manipulation, fear and insecurity, and these have to be mitigated as much as possible. Many authors argue that collective action and self-mobilisation by participants demonstrate successful PAR (Kindon, Pain and Kesby, 2007a). The extent to which the research for this thesis led to action and social transformation is explored in Chapters 6 (Peas Please) and 7 (Discussion).

3.3.1 Researcher reflexivity and positionality

Reflexivity is generally understood as the "researcher's engagement with his or her own positioning in relation to the world she is researching and/or the self-conscious writing up of research as itself an act of representation" (Gray, 2008, p.396). Here I reflect on how my positionality has influenced the choice of research approach for this thesis. This section is written in the first person to provide a better reflection of my personal engagement with the subject.

I did not come to the research for this thesis from a neutral standpoint, though perhaps nobody could be described as doing so. I was a food sustainability activist who had worked for 15 years in community development, in Glasgow and in Wales,

trying to improve diet, food security and sustainability. Latterly I was involved in setting up an allotment site and a community orchard in rural West Wales and it could be said that I sit within the 'alternative' food system paradigm. I came to the research for this thesis through an advert, circulated by the University of Glamorgan[11] to members of the Federation for City Farms and Community Gardens, for a studentship to study the question 'Could and should Wales feed itself?' The studentship was the result of a cross departmental collaboration within the university, between the Programme for Community Regeneration and Science Shop Wales, which were both concerned with practical change and participatory research.

At the time I was grappling with the question of where community growing fits in the bigger picture of food security and sustainability and through the process of researching this thesis and reflecting with others within the food system, I have tried to answer this through the lens of fruit and vegetable production and consumption.

I could be described as a healthist (Guthman, 2011), in that I am preoccupied by the belief that people should have the opportunity to be healthy and I go along with the school of thought 'business as usual is not an option' (Beddington *et al.*, 2011) as well as believing that "we need not wait to see what others do" (Gandhi, 1913, p.158).

As well as being a food sustainability activist I have had an active academic life with a BA in Human Sciences, a multi-disciplinary degree that recognises the need for convergence across subjects in relation to studying humans. At the same time as working for community projects on healthy eating promotion I also undertook an MSc in Public Health Nutrition. The research for the MSc dissertation was undertaken in the community I was working with and could be classed as a form of action research. During my career in community development I was trained in the use of PAR techniques and have used them extensively since in food-related community activism as well as research.

These experiences have led me to believe that answers to food system problems, particularly public health, lie in systemic change and in stakeholders from across the system, including researchers, working together and not in isolation. My interest lies

[11] now the University of South Wales.

in doing research to achieve positive change rather than for the purpose of research itself. I would define myself as a food sustainability activist who uses research as a tool. PAR was a relevant and apt tool to adopt given this positionality and particularly the genre of PAR some call Solidarity Action Research (Chatterton, Fuller and Routledge, 2007).

3.3.2 Solidarity Action Research

There are many interpretations of PAR worldwide and considerable differences methodologically, epistemologically and politically (Kindon, Pain and Kesby, 2007b). Some PA Researchers are more interested in research than action, some more interested in participation than action, and others more interested in action than research and so on. Some, for example Chatterton, Fuller and Routledge (2007), believe that there is too much PAR where the research is seen as more important with no associated social transformation. PAR activists want to counter this tendency and are more interested in collaborative research that results in action and social transformation. The term Solidarity Action Research (Chatterton, Fuller and Routledge, 2007) is sometimes used to describe this genre of PAR. It involves a "commitment to social transformation, challenging power relations, showing solidarity, recognizing and using emotions, being the change you want to see and building spaces for critical dialogue" (Chatterton, Fuller and Routledge, 2007, p.222). These aspects distinguish activist research from action-based research. Activist research shares a history with militant research (Russell, 2015) which involves an ethnographic approach where research activists work alongside other activists who share the same desires for social change to co-create research and jointly develop solutions.

The approach to PAR adopted for the research of this thesis is akin to Solidarity Action Research in that the researcher is an activist working in Wales to try and develop a more food-secure and sustainable food system. Research is a tool used here with other stakeholders within the food system in Wales and the UK; some of whom explicitly identify as activists trying to improve the food system and some who do not.

The platform or space for discussion created by this PAR is one where the public health needs of a place of consumption are linked to the food system of place and future sustainability. Whether, as Chatterton, Fuller and Routledge (2007, p.218) articulate, the research has managed to “produce critical interpretations and readings of the world, which are accessible, understandable to all those involved, and actionable” is explored. Also explored is whether the approach offers new insights, enhances understanding of relationality between stakeholders and possible convergence and in turn facilitates positive social change. Critical reflection of the process is important: the part the research and learning aspect played, mutuality of relationships, and participation or facilitating action itself. These issues are explored in Chapter 7 (Discussion) and offer a contribution to the theory of practice around PAR and specifically Solidarity Action Research approaches.

There is the obvious concern with Solidarity Action Research and other PAR regarding lack of researcher impartiality and neutrality. Chatterton, Fuller and Routledge (2007), among others, contend that impartial workshop facilitation remains possible while the overall aims of the work may remain highly political and aim for transformation. They also contend that if real solidarity and mutuality is worked at, critique and disagreement are vital, and help generate solutions. The next section outlines the methods used in the Solidarity Action Research for this thesis.

3.4 Methods

A range of methods are adopted for PAR which reflects the participative nature of the research process. Methods include the use of dialogue; for example: semi-structured interviews, storytelling, video, diagramming or mapping, and collective action (Kindon, Pain and Kesby, 2007b). For the purposes of this research, the methods considered most appropriate were: use of secondary data and public health recommendations, presentation of research and approach, visioning, semi-structured interviews, workshops and participative engagement (see Figure 23). Justification for the choice of these methods follows.

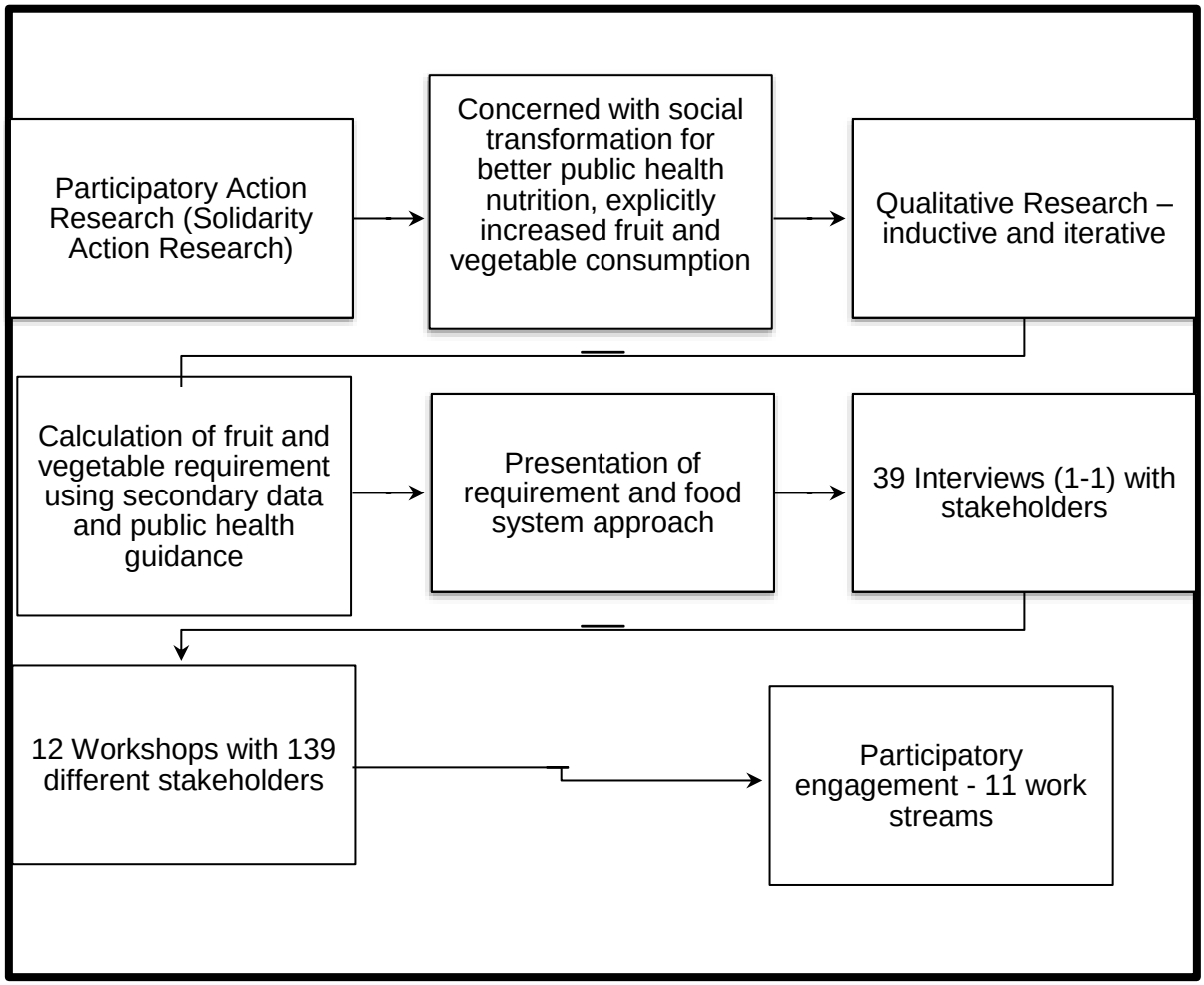


Figure 23. Mixed methods utilised as part of PAR approach.

3.4.1 Secondary data collection and public health guidance

Secondary data sources, mainly governmental, were used to estimate fruit and vegetable requirement. The advantage is that this data is already considered by government and other organisations as acceptable for public policy generation. One disadvantage is that there are sometimes limitations to the available data; for example: population size estimates are estimates only, and data on waste only represents a best approximation given the inherent difficulty of calculating waste across the supply chain. The most up-to-date public health guidance was also used in an attempt to align the work with public policy. Specific sources used for the calculation of the fruit and vegetable requirement are detailed and critiqued in the results section.

3.4.2 Presentation of the food system approach

> "A hallmark of a genuine participatory action research process is that it may change shape and focus over time (and sometimes quite unexpectedly) as participants focus and refocus their understandings about what is 'really' happening and what is really important to them." (Wadsworth, 1998, p.5)

At the initial exploratory phase of the research process there was a continual reference by some stakeholders to the perception that consumers drive change in the food system; that the system will only change when individuals educate themselves and accordingly change their behaviour to a healthy eating pattern. This inevitably led to solutions being framed in the form of the need for more healthy-eating education, more cooking classes, and more local food outlets. There are at least two things at work here: one is the dominance of the individualisation of the food-security narrative and the other is the class-based judgement as to what to do about it; here perhaps a middle class framing of the solutions as identified by Paddock (2011).

As discussed in the literature review, although there are recommendations for consumption at an individual level and much work has been done to try and encourage individuals to eat more fruit and vegetables in the UK, this has so far failed to increase consumption. In fact, it has gone down since the '5 a day' campaign was adopted as public health policy in 2003. The purpose of this research was to move beyond the individualised food security frame to a systemic frame, and to look at food system solutions; hence at the beginning of each interview or workshop it was necessary to set the theoretical context. It therefore became necessary to reiterate that individual consumer approaches had so far been unsuccessful in driving change.

In order to convey a message to people this was represented diagrammatically using the basic representation of a food system adapted from the Vermont Farm to Plate Strategic Plan (Vermont Strategic Jobs Fund, 2013, p.8), as follows:

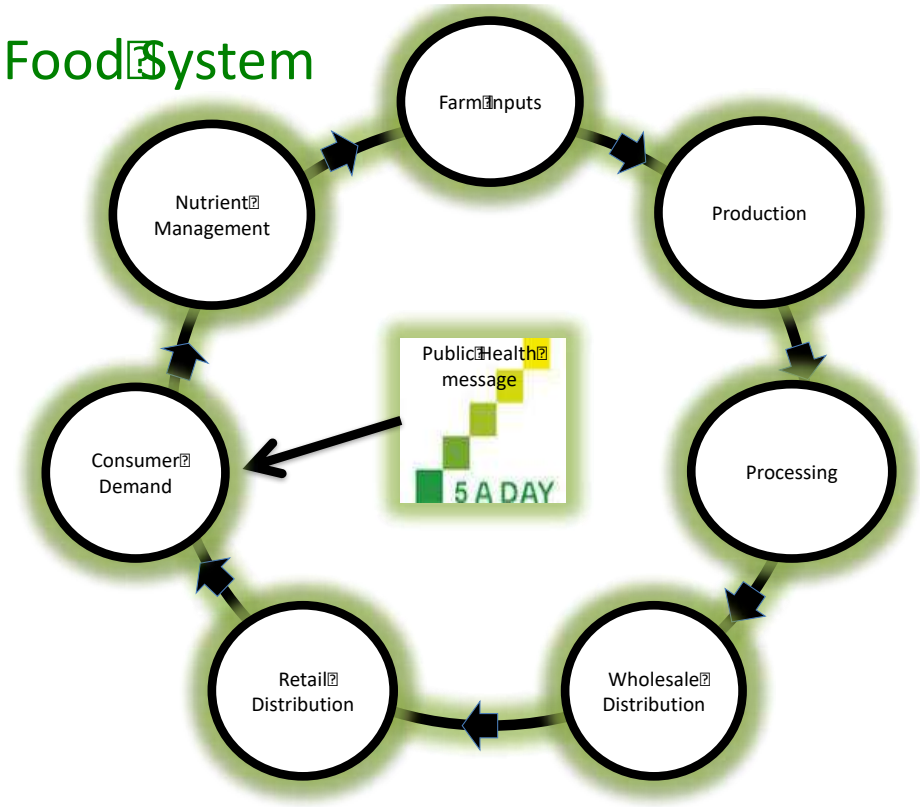


Figure 24. Symbolic representation of current public health nutrition policy in relation to the food system.

A theory was proposed by the researcher that the public health message had so far focused mainly on one part of the food system, namely consumers, and that this has not been enough to drive change in the whole system. Meanwhile, it was suggested, much of the rest of the system has been on a different trajectory, increasing the relative availability of high fat, salt and sugar foods compared to fruit and vegetables, creating a food environment which makes it more difficult to eat healthily.

The reason this diagram was utilised rather than a more complicated representation of a food system, as illustrated in the literature review, is that it was considered important to express the theory of the research in terms that were understandable to people. The underlying premise of the research is that it is stakeholders and individuals within the system who hold the potential to drive change. Whether this proved transformative is critically discussed in the results and discussion.

Although many stakeholders knew that consumption of fruit and vegetables was low, they had not problematised the consensus solution that telling and showing people how to cook and eat more fruit and vegetables had so far not increased consumption. Comparing consumption to the effectiveness of the consensus solution and showing

that so far it had been ineffective opened up a new frame for discussing solutions. Into this frame this research suggested an alternative idea, that the wider food system may also have a role to play in influencing consumption. This was illustrated as follows:

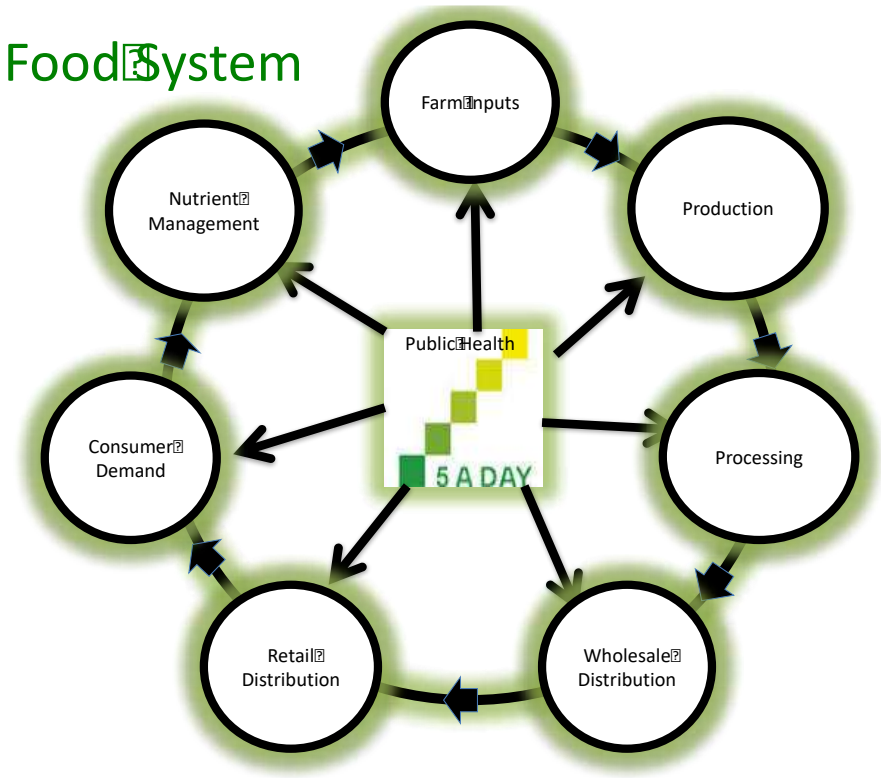


Figure 25. Symbolic representation of suggested food system approach to public health nutrition which forms the basis for this research.

For some this was their first exposure to a food system approach to public health nutrition. The extent to which presenting the food system approach in this way may have influenced engagement and social transformation is explored in the results and discussion.

The first iteration of the presentation (illustrated in Appendix 4) was drawn on eight sheets of flip-chart paper. The main points the presentation covered were:

1. There is a disconnect between what we are eating and producing in Wales.
2. Wales has many diet-related health problems.
3. Wales only grows fruit and vegetables on 0.1% of the land.

4. The ‘5 a day’ campaign has so far failed to raise consumption. In fact, consumption has gone down since the campaign began.

5. So far ‘5 a day’ message has been focussed mainly on consumers, which has not been enough to drive change in the whole system.

6. What is needed is for a systemic approach to ‘5 a day’ where all parts of the food system are working towards increasing consumption.

7. Taking production alone, only 2% of the land in Wales would be required to grow ‘5 a day’. How much fruit and veg should be grown in Wales? How could it be achieved? Would this make a difference to consumption and health?

Stakeholders responded to the theory and data presented, and their comments formed part of the iterative analysis. Each time the presentation was given, in line with PAR methods, it was adjusted to take into account critical responses from stakeholders. How this affected the final research is explored in the results section. The seven points above remained core to the presentation but after engagement it became clear that there was a need to explore aspects beyond production. The presentation evolved and over tens of iterations, ultimately becoming a 30-page PowerPoint presentation (see Appendix 5) that was eventually delivered to a new Cross-Party Group on Food at the Welsh Assembly in May 2017 and at the Welsh Government Pavilion at the Royal Welsh Show at a Peas Please event in July 2017.

3.4.3 Use of visioning and scenarios in PAR

The generation of the Welsh population’s fruit and vegetable requirement, from secondary data sources, provided the opportunity for future visioning and backcasting from that vision. It was hoped that this might help to facilitate action as Wadsworth (1998, p.4) suggests:

> “The moving to new and improved action involves a creative ‘moment’ of transformation. This involves an imaginative leap from a world of ‘as it is’ to a glimpse of a world ‘as it could be’.’’

Scenarios and visioning are recognised as a useful tool in food futures work to try and assess possible ways forward to achieve greater food security and sustainability.

Examples include ‘Agrimonde’ (Dorin and Paillard, 2009) and ‘Food Futures’ (Ambler-Edwards *et al.*, 2009).

The PAR approach, using the fruit and vegetable requirement with stakeholders (in semi-structured interviews and workshops) in the agri-food sector, allowed possible futures to be explored by being “a performative practice where new subjectivities might be explored, realised and reiterated” (Roelvink, St Martin and Gibson-Graham, 2015). The extent to which this did provide new theoretical insights and potential social transformation is explored in Chapter 7 (Discussion).

PAR is useful to explore potentially different future scenarios involving different relationships because it does not presuppose a particular end point. As Wadsworth (1998, p.4) points out PAR “knows it is coming from somewhere and going to somewhere, even though it does not know in advance where *precisely* it is going to end up or what the new state will look like.”

3.4.4 Semi-structured interviews

Semi-structured interviews were chosen as the key method of data collection given their utility in exploring a range of issues in-depth in a systematic but flexible manner. Problems with these types of interviews are that they are time-consuming, discussion is sometimes wide-ranging and greater effort is required from interviewees, and they are non-replicable and non-comparable. Benefits are that people can answer in their own terms, unusual answers are possible, and new areas can be explored in detail. A completely structured approach would not have allowed the flexibility to explore the food security, sustainability and convergence issues; and a non-structured approach would not be targeted enough to explore the research questions. Structured parts of the interview gave the opportunity to answer more quantitative questions about the fruit and vegetable requirement and capacity in light of that requirement which fed into theorisations around relationality.

Interviews took the form of introductions and background (see interview guide for more detail, Appendix 1). Each interview then began with the food system and research presentation. Questions then followed around how much of the fruit and vegetable requirement should be grown in Wales/UK, what might help, who should grow it, possible relationality and convergence, potential barriers to production,

potential barriers to consumption, and any other issues. Given the PAR approach, interviews differed depending on how the participants responded.

3.4.5 Workshops

Workshops began with the presentation of the food system approach and the fruit and vegetable requirement data, and followed the same outline as the semi-structured interviews; but they were particularly used for exploring joint construction of possible futures, and to explore specific issues, and relationality and convergence. Issues with the workshop approach include, that there is less control, the data can be difficult to analyse and organise, and there may be group effects, for example by dominant characters (Bryman, 2012). Another issue is that if they are recorded they may be difficult to transcribe. This was avoided by using participatory techniques.

It was not always possible to inform everybody present in detail of the research process. To counteract this, a brief explanation was given in the workshop or meeting and this was then backed up with a more detailed email explanation asking permission to use the information gathered where appropriate. Quotations were also anonymised.

3.4.6 Participatory engagement

The informal rules of reciprocity involved in undertaking PAR with stakeholders and an inherent desire within the research approach to facilitate social change dictated that engagement with stakeholders took place beyond workshops and interviews. This was greatly facilitated, within the context of a PhD, by part-time study. Participatory engagement took place over a year following the interviews and workshops (2016–2017) and involved attending meetings and contributing towards actions generated. This helped to develop a deep understanding, based on experience, of what held the greatest transformative potential around increasing fruit and vegetable production and consumption in Wales and the UK. There were 11 different strands to the participatory engagement: The Food Values Event; Wales Food Manifesto; Food Network Wales; Growers of Wales; Calon Cymru; Tyfu Cymru; Federation of City Farms and Community Gardens (herein called ‘City Farms’) and their RDP-funded project Tyfu Fynu along with the Community Land Advisory Service

(CLAS); Welsh Assembly Cross-Party Group on Food; National Assembly for Wales Climate Change, Environment and Rural Affairs Inquiries; Peas Please and Food Cardiff/Food Sense Wales. See Figure 26 for details:

Participatory engagement	**Description**	**Key stake-holders**	**Description of activities**
1. Food Values Event (Cardiff)	Launch of Food Values Report and workshops with NGO food stakeholders from across Wales to discuss how identifying common food values can help to bring people together to discuss and improve the food system.	Better Organic Business Links (BOBL). Public Interest Research Centre (PIRC). University of Bangor.	Facilitation of workshop at Food Values event.
2. Wales Food Manifesto	Food Manifesto to identify actions the Welsh Government could take to create a better food system.[12]	Wales-based food security and sustainability activists and researchers.	Blog, on fruit and vegetable requirement to land, on website. Help developing Manifesto, attendance at three meetings and networking with group.
3. Food Network Wales	Born out of the Food Manifesto work, Food Network Wales is in its early stages. It attempts to bring stakeholders together from across Wales to discuss issues related to food sustainability and to spread good practice.	Wales-based food security and sustainability activists and researchers.	Attendance and participation at three meetings and workshops to discuss the development of the Network.
4. Growers of Wales	Growers of Wales. Horticultural growers of different types from	Horticultural producers and support organisations,	Facilitation of workshop and hosting and chairing one

12 https://foodmanifesto.wales

	across Wales meeting to discuss shared issues.	the Community Land Advisory Service, 'City Farms', PLANED.	meeting. Email networking.
5. Calon Cymru	The Calon Cymru Network is a community interest company formed for the purpose of encouraging sustainable rural regeneration projects along the Heart of Wales railway line corridor.	Network of geographers, planners, architects, housing specialists, local economics, education, transport, energy, forestry, horticulture, law and community development.	Three meetings and written evidence provided for Calon Cymru on Wales fruit and vegetable requirement and land implications. Membership of and collaboration with group.
6. Tyfu Cymru	Tyfu Cymru (Grow Wales) aims to build the capacity and capability of the Welsh horticulture industry.	Rural Development Plan (RDP) funded (2016-2020). Project led by Lantra. Key stakeholders Puffin Produce, ADAS, PLANED.	Four committee meetings attended in the run up to successful funding. Follow up meetings with Tyfu Cymru staff. Networking and collaboration on Peas Please.
7. 'City Farms' (Tyfu Fyny) & the Community Land Advisory Service (CLAS)	Tyfu Fyny (Growing Up) builds on previous work (Tyfu Pobl) and supports community growing activity in Wales. The Community Land Advisory Service aims to help community growing groups, landowners – plus others involved in land access – to work together to make more land available for community growing.	RDP funded (2016-2020). Led by 'City Farms'. Big Lottery funded. Supported by 'City Farms'.	Presentations at two events for 'City Farms'/ the Community Land Advisory Service and facilitation of workshops. Fruit and vegetable requirement data to land provided for use on

			posters. Networking and collaboration on Peas Please.
8. Welsh Assembly Cross-party group on Food	Cross-party group to highlight and discuss key food issues with assembly members.	Chaired by Jenny Rathbone (AM) at the National Assembly of Wales and hosted by Food Cardiff.	Inaugural presentation of research and subsequent attendance at tri-annual meetings.
9. National Assembly for Wales Inquiries	Climate Change, Environment and Rural Affairs (CCERA) Committee: Inquiry into the Future of Agricultural and Rural Development Policies in Wales And National Assembly for Wales: CCERA Committee Inquiry: Rethinking Food in Wales (2017) What is your vision for the future of food in Wales and what needs to be done to achieve it?	National Assembly for Wales CCERA Committee.	Written Submissions.
10. Peas Please	Peas Please aims to bring together farmers, retailers, fast food and restaurant chains, caterers, processors and government departments with a common goal of making it easier for everyone to eat vegetables.	Food Foundation. Nourish Scotland. Food Cardiff. WWF-UK.	On project board since inception. Two-hour bi-weekly Skype meetings. Bi-monthly meetings in London (involvement outlined in detail in Chapter 6 (Peas Please))

11. Food Cardiff/ Food Sense Wales	Food Cardiff was set up in recognition that the food we eat has an impact on our health, our communities, businesses, individual farmers, and the environment. It works to make food good for people, for the place we live, and for the planet, as well as affordable and tasty. Food Sense Wales is a new organisation (2017) which aims to apply the knowledge, expertise and experience gained from Food Cardiff and stakeholders across the Welsh food chain, to help shape food policy that makes sense across the whole of the food system in Wales; to the economy, the nation's health and the environment.	Food Cardiff. Food Sense Wales.	Monthly meetings by Skype/ face-to-face plus regular email/phone communication regarding organisation of Peas Please in Wales.

Figure 26. Detail of Participatory Engagement 2016–2017.

Notes were taken during participatory engagement and these critically reflected upon in addition to the interview and workshop analysis. Findings are discussed in Chapters 6 (Peas Please) and 7 (Discussion).

3.5 Sample

The fruit and vegetable system activities for this research were conceived of along the same lines as the food system illustrated in the 'Vermont Farm To Plate Strategic Plan' (2013), as outlined in Chapter 2 (Literature Review, Figure 9). That is, that food system activities can be broadly categorised into farm inputs, production, processing, wholesale distribution, retail distribution, consumer demand, nutrient management, and the support system (including government, researchers and NGOs).

It was initially envisaged that stakeholders from all these categories would be involved in the research process, but it was decided, for capacity issues, to engage firstly with producers and those involved with supporting producers and with trying to facilitate greater consumption of fruit and vegetables and development of more sustainable food systems; for example, government and NGOs. Ultimately, through the participatory engagement process, stakeholders from across the whole food system were engaged with.

An attempt was made to select stakeholders who had a depth of experience and influence within the sector. This was possible for the interviews but less so for the workshops where in some cases stakeholders self-selected according to whether they were interested in the topic being discussed. This may have biased the sample towards those interested in change or action. However, given that this was what the research was exploring it was not considered problematic to the research outcome.

Inferences were being drawn to theory and not to population, so participants were selected on the basis of being stakeholders of experience and influence in relation to the fruit and vegetable food system in Wales and the UK. A cross section of stakeholders from across the range of the so-called ‘mainstream’ and ‘alternative’ were approached as part of a purposive, targeted sample. In reality, as described in Chapter 2 (Literature review), the distinctions between ‘alternative’ and ‘mainstream’ are not clear cut. For the purpose of this research, ‘mainstream’ was generally associated with large-scale production and distribution of fruit and vegetables through the supermarket system, and ‘alternative’ to small-scale production and those who identified themselves with trying to provide an alternative in some way to the ‘mainstream’ system. Here, small-scale growers are classed as growing on less than five hectares, and large-scale on more than five hectares. This, to some extent, is an arbitrary distinction; but it reflects the different way that producers are treated in planning law, specifically ‘The Town and Country Planning (General Permitted Development) Order 1995’ (HM Government, 1995): those over five hectares benefitting from permitted development rights, and those below not. This has also historically been a distinction for the purposes of assessing eligibility for European

Union Common Agricultural Policy (CAP) payments: those above five hectares being eligible, and those below not.[13]

Snowball sampling was also used in order to highlight relevant participants who were not immediately apparent. This approach risked introducing bias by skewing the sample towards the perspective of a certain cohort. To avoid this, an attempt was made to match the ratio of stakeholders from large-scale and small-scale producers. Given the lack of comprehensive data on horticultural producers in Wales, this had to be estimated. This is discussed in more detail in the sample limitation section.

During the participative research process it became apparent, and in line with the snowball sampling technique, that there was also a need to engage with some fruit and vegetable processors, and distributors and stakeholders involved with education, training, research and marketing. The majority of the sample however consisted of fruit and vegetable producers and organisations that support those producers (see detail below). It also became apparent that there was a need to engage with people of influence within public health nutrition spheres, and the fruit and vegetable food system beyond Wales.

In terms of number of participants, the minimum number of between 20–30 qualitative interviews in accordance with Warren's rule (2002, p.99) was adopted and surpassed. Along the lines of grounded theory the sample was considered to be sufficient, sample saturation, when no new themes were emerging.

3.5.1 Combined interview and workshop sample

Including interviews and workshops, but not including the participatory engagement, 178 different stakeholders engaged with the research process. 115 were involved in fruit and vegetable production and/or distribution, or were support organisations. Of the other 63, 15 were involved in food education or training and development, 29 in food governance, 16 were NGOs supporting sustainable food environments, and three were in food marketing or communications, see Figure 27 below:

[13] EU Nation states were given the option to extend subsidies to those growing on less than five hectares, but the UK and Welsh Governments chose not to do this in the last negotiation of CAP.

Interview and workshops – stakeholder groupings combined		Number
Fruit and vegetable producer/distributor/ support organisations	Fruit and vegetable producer and distributor	83
	Fruit and vegetable distribution only (public)	2
	Fruit and vegetable distribution only (private)	5
	Representative bodies and other support/advice providers to food producers and supply chain	25
	TOTAL	115
Other support	Food education/training/Research and Development	15
	Food governance/public health/ statutory	29
	NGOs supporting sustainable food environment development	16
	Food marketing/communications	3
	TOTAL	63
	OVERALL TOTAL	178

Figure 27. Interviews and Workshops – Stakeholder groupings combined.

The next two sections separately detail the interview and workshop samples.

3.5.2 Final semi-structured interview sample

Thirty-nine stakeholders were interviewed in total. Twenty-seven were fruit and vegetable producers or distributors or from support organisations. The other 12 comprised food educators or trainers, statutory food and health governance, and NGOs supporting the development of sustainable food environments, see Figure 28 below (and Appendix 2 for more specific details):

Interview – stakeholder groupings		Number	'Alternative'	'Mainstream'
Fruit and vegetable producer/ distributor/ support organisations	Fruit and vegetable producer and distributor	9	7	2
	Fruit and vegetable distribution only (public)	2	0	2
	Fruit and vegetable distribution only (private)	0	0	0
	Representative bodies and other support/advice providers to food producers & supply chain	16	6	10
	TOTAL	27	13	14
Other support	Food education/ training/Research and Development	2	1	1
	Food governance/public health/statutory	6	2	4
	NGOs supporting sustainable food environment development	4	4	0
	Food marketing/ communications	0	0	0
	TOTAL	12	7	5

	Overall totals	39	20	19

Figure 28. Stakeholders interviewed.

In terms of representation across the so-called alternative and mainstream divide, 51% identified in some way as offering an alternative to the ‘mainstream’ system. It was not always clear which stakeholders identified as ‘alternative’ and, as discussed in Chapter 2 (Literature review), this is somewhat an arbitrary distinction. For this research it was made on the basis of whether, in their dialogue, they problematised the ‘mainstream’ food system and in their activities attempted to offer an alternative to it. The reason for making some sort of attempt to make a distinction, when one might not actually exist, was to ensure that there was a cross section of stakeholders so that relationality and convergence could be explored. The reality was that there were divergences between different stakeholders of many kinds that outstripped the usefulness of the ‘alternative/mainstream’ conceptual dichotomy. The potential for the PAR approach of combining production and consumption to explore these multiple relationalities and possible convergences form parts of the results and discussion of this thesis.

3.5.3 Workshop sample

Twelve workshops were conducted encompassing 184 stakeholders. Forty-five stakeholders took part in more than one workshop meaning 139 different stakeholders engaged in the workshops overall. See Figure 29:

Workshop	Number of stake-holders	Number of stake-holders who had previously engaged	'Alternative'	'Mainstream'
Food Values Event (OCW) workshop, Cardiff	9	2	7	2
Food Manifesto meeting/blog	5	1	4	1
RDP Horticulture Funding meeting	12	7	2	10
Banc CSA workshop, Carmarthenshire	3	0	3	0
CSA Network, Carmarthenshire	20	3	20	0
'Fill the Streets with fruit and veg' Event (Community Land Advisory Service) and workshop, Conwy	19	2	18	1
Growing our Growers event (PLANED), Pembrokeshire	20	0	0	20
Calon Cymru, Llandovery/Builth wells	4	0	4	0
Plaid Cymru Party Conference fringe event, Aberystwyth	20	1	10	10
Food Cardiff, Cardiff	9	5	6	3
Future Generations Growers conference (CLAS), Cardiff	36	16	25	11
Vegetable Retreat (Food Foundation, Nourish Scotland and WWF), Birmingham	27	6	14	13
Total	184	45	113	71
Total number of stakeholders	45 of the above took part in more than one workshop and so the total number of different stakeholders involved was 139		61% identified as trying to offer an alternative to the 'mainstream' system	

Figure 29. Workshop stakeholder groupings (of stakeholders not previously engaged with).

Of the 139 different stakeholders involved in the workshops, 88 were producers or distributors or from supporting organisations. Of the other 51, 13 were in food education/training and development, 23 in food governance, 12 were NGOs supporting sustainable food environments and three were in food marketing or communications (see Appendix 4). Overall, 61% identified as attempting to offer an alternative to the 'mainstream'. This may be an over-representation but it was partly a reflection of the relatively greater number of small-scale producers engaged in what they would sometimes consider alternative compared to the large-scale.

Along the lines of the PAR approach, with the exception of three workshops (Banc CSA, Food Cardiff, and Calon Cymru), workshops piggybacked on events or workshops already taking place. An attempt was made to conduct workshops with a variety of stakeholders at different events but it was not always possible to ensure an equal distribution across the 'alternative' and 'mainstream' divide.

Some workshops were dominated by a certain sector, for example Community Supported Agriculture (CSA) schemes, which are partnerships between farmers and consumers in which the responsibilities, risks and rewards of farming are shared (CSA Network UK, 2018b). In practice this often involves members paying for produce in advance and then receiving a share of the produce on a weekly basis throughout the year. Workshops such as this enabled detailed consideration of the fruit and vegetable requirement and scenarios in relation to one group of stakeholders with some discussion of how this linked to other stakeholders. Others, for example the Food Cardiff and Peas Please workshops, had a diversity of stakeholders that promoted cross-sectoral discussion, and enabled exploration of relationality and solutions based on convergence. Workshops took place across Wales, with one in Birmingham, as part of Peas Please, looking at the UK rather than Wales vegetable requirement against production, barriers and future vision for the sector. Having stakeholders who participated in more than one workshop allowed the opportunity for greater reflexivity and ongoing co-analysis of the research.

The Food Manifesto workshop also involved a blog about the fruit and vegetable requirement. This was disseminated more widely on the Wales Food Manifesto

website (https://foodmanifesto.wales/2015/09/25/beyond-5-a-day/). This was part of the participatory process and online reactions were incorporated into the analysis of the data.

3.5.4 Sample drawbacks

There is a skewing of the sample towards those who identify as ‘alternative’ for the workshops (61%) though not for the interviews (51%). Overall the average was 56%. However, since this distinction was considered rather arbitrary and an attempt was made to explore relationality and convergence on a range of aspects and scales regardless of a basic ‘alternative’ or ‘mainstream’ distinction, then this was not considered problematic.

It would perhaps have been beneficial to interview more producers or distributors on a one-to-one basis. Producer or distributor representative bodies and support organisations were included in the sample in an attempt to extend the reach of the sample. Also, 74 producers were engaged with during workshops.

The representation of large-scale producers or distributors was small but this is reflective of the actual number of large-scale growers in Wales. According to research collected for this thesis, there are only three large-scale producers in Wales big enough to be eligible to pay the AHDB levy; that is to say they have income from horticultural production over £60,000 (AHDB Horticulture, 2017). However, there are a considerable number of producers over five hectares, who for the purposes of this research are classed as large-scale; a number of these were interviewed and more took part in workshops. There is no definitive record of horticultural businesses in Wales, since there is no obligation for those not receiving subsidies (those under five ha) to register agricultural activity and there are many producers who produce on less than this. This is an issue for those attempting to support horticulture in Wales and a recommendation would be that a horticultural business register is created. Research on horticulture in Pembrokeshire (Wheeler, 2013) gave an indication of relative number of producers of different sizes in one area of Wales, approximately 20% being large-scale and 80% small. This was used as a guide to indicate distribution of small and large-scale producers/distributors in Wales more widely. The sample broadly reflects the approximated relative number of stakeholders engaged

at the different scales in Wales, for example in the case of one-to-one interviews, two large-scale producers and seven small-scale were interviewed. The issues raised therefore may partly be a reflection of the on average small size of horticultural business. The issues for England, which has a higher proportion of large-scale growers are likely to differ.

Allotment Associations were not interviewed, as the sample was restricted to fruit and vegetable producers engaged in selling produce in some capacity. That is not to say that home and allotment production is not important, and secondary data was utilised to model how much production might come from this type of production alongside other types of production and distribution (see Chapter 4 (Requirement)).

It would have been beneficial to interview more stakeholders in the supply chain in Wales. One of the problems of accessing the larger fruit and vegetable supply chain businesses is that they often do not have a regional Welsh base, but rather head offices and decision-making occur more centrally in England. Key UK supply chain stakeholders (see Appendix 3) were involved in the Birmingham Vegetable Retreat workshop as part of the Peas Please initiative and they provided important insights. Through participative engagement through Peas Please many more supply chain businesses and organisations became engaged in how to increase the consumption of vegetables, this is expanded upon in Chapter 6 (Peas Please).

3.6 Timescale

Interviews and workshops took place between September 2015 and October 2016. Given the PAR methodology with the ongoing aspiration to achieve social change, and the importance of maintaining relationships and reciprocity, the reality is that the participatory engagement lasted until December 2017 and is still ongoing. This was one of the challenges of using a PAR approach within a PhD by thesis setting. In order to write up a thesis it is necessary to withdraw from participation just at the time when resulting action is likely to be taking place. For this thesis, during the final writing up process, the researcher withdrew from as much action as possible, but obligations to fellow stakeholders and the desire for change meant that full disengagement was neither possible nor desirable. The resulting workload and pressure was thus greater than it might have been, but it served to keep the writing-

up process grounded in the social transformations occurring within the food sustainability and security, fruit and vegetable food system, and public health nutrition sectors. A criticism could be mounted that this meant that the researcher was not able to sufficiently disengage from the research to achieve objectivity. The extent to which this was the case can be judged by critical reflection on the results and discussion.

During this time there were two significant political changes that influenced the research, one was the introduction of the Well-being of Future Generations Wales Act (Welsh Government, 2015b) and the other was the post UK referendum decision to exit the European Union ('Brexit'). The implications of these changes are elaborated on in the discussion but particularly the imminence of 'Brexit' meant that the there was more urgency to engage in the political process to translate the findings of the research into policy and action.

3.7 Data analysis

Interviews were recorded, where permission was provided, and noted down where not. Recorded interviews were transcribed and notes written up. Workshop flip chart notes were photographed and transcribed and written up. Photographs were taken where applicable. Stakeholders engaged in iterative analysis that was fed into the research process. As well as testing theory, this also spread ownership of the research. Notes from participatory engagement were written up and critically reflected upon separately from the interview and workshop data which formed the core data for analysis.

The final stage of data analysis was not participative and entailed a period of reflection by the author; although there were informal discussions with stakeholders, particularly on process. All the data was reread and interviews reconsidered in order to establish deep immersion in the data. During this process themes were identified. These themes were then used as a starting point for detailed coding of all transcriptions using the qualitative data analysis tool NVivo (QSR International, 2016). NVivo is computer-aided qualitative data analysis software that does the manual labour of cutting and pasting interview transcripts to be analysed. Advantages are that it makes coding and retrieval of information quicker, it can

provide new opportunities for analysis, it potentially provides more transparency, it urges looking at connections between themes, and it can show frequency of use of themes systematically. Disadvantages are that it might tend to quantify data, it can exaggerate the use of codes for themes, and it can lead to fragmentation of data and de-contextualisation of data. It is not good for thick descriptions and is inappropriate for focus groups as the group dynamic influence is lost. The coded data formed the basis for the discussion of the results. Results from the participative engagement take the form of critical reflection on the part of the researcher on meeting notes and outcomes.

3.8 Ethics and consent

This research adhered to the University of South Wales guidelines for research as set out in the University of South Wales Research Code of Conduct. That is, to strive for excellence, honesty, integrity, co-operation, accountability and safety (University of South Wales, 2018). More specifically, the six key principles of ethical research, as set out by the Economic and Social Research Council framework for research ethics were followed (ESRC, 2015, p.4):

1. Research participants should take part voluntarily, free from any coercion or undue influence, and their rights, dignity and (when possible) autonomy should be respected and appropriately protected. (Participants were given a summary of the research at the outset.)
2. Research should be worthwhile and provide value that outweighs any risk or harm. Researchers should aim to maximise the benefit of the research and minimise potential risk of harm to participants and researchers. All potential risk and harm should be mitigated by robust precautions.
3. Research staff and participants should be given appropriate information about the purpose, methods and intended uses of the research, what their participation in the research entails and what risks and benefits, if any, are involved.
4. Individual research participant and group preferences regarding anonymity should be respected and participant requirements concerning the confidential

nature of information and personal data should be respected. (Participants were assured that anonymity would be protected as far as possible.)

5. Research should be designed, reviewed and undertaken to ensure recognised standards of integrity are met, and quality and transparency are assured.
6. The independence of research should be clear, and any conflicts of interest or partiality should be explicit.

Where the researcher engaged with other organisations to co-create research documents in the public domain, the researcher is listed as a co-author or referenced in the text. For this thesis, although the methodology was PAR, the final analysis, critical reflection, theorisation and writing up were all conducted by the researcher and are independent.

3.9 Summary

This chapter began with an overview of the research aims. It then went on to discuss research methods and outlined the rationale for adopting Participatory Action Research (PAR). The benefits and drawbacks of the PAR approach were discussed. Following a reflection on researcher positionality, the reasons for adopting the PAR genre of Solidarity Action Research were explored. Exact methods adopted were then outlined in more detail: a triangulated mixed methods approach utilising secondary data and public health recommendations, presentation of food system approach, visioning, semi-structured interviews, workshops and participatory engagement. The sampling frame was then explored and an analysis of the stakeholders involved in the semi-structured interviews and workshops provided. Details of participatory engagement that developed from the PAR are discussed. The section ended with some comments on timescale, data analysis and finally reflections on ethics and consent.

The following three chapters detail the results of employing the methodology outlined here. Chapter 4 (Requirement) presents quantitative data on the fruit and vegetable requirement as well as qualitative data from interviews and workshops on stakeholder response, Chapter 5 (Barriers and Enablers) the barriers and enablers to greater fruit and vegetable production and consumption in Wales, and finally Chapter

6 (Peas Please) the development of Peas Please, a UK initiative to increase vegetable consumption and production through food system change.

The next chapter outlines the fruit and vegetable requirement of Wales and the UK and how stakeholders reacted to it along with scenarios for production.

4 Fruit and Vegetable Requirement

4.1 Chapter overview

The first half of this chapter is quantitative in nature with a detailed explanation of how the population fruit and vegetable requirement of Wales was calculated. It then goes on to look at the implications of waste on this requirement and of linking the requirement to production in terms of land needs. It then compares the fruit and vegetable requirement to consumption and availability, and details how the 'Eatwell Guide' (PHE, 2016b) increase to '7 a day' affected the Wales fruit and vegetable requirement. The UK fruit and vegetable requirement calculations are also outlined.

The second half of the chapter is qualitative and goes on to explore, according to stakeholders, how much of the fruit and vegetable requirement should be grown in Wales and how they reacted to the presentation of the requirement and associated data. The chapter details how the requirement was taken up and then goes on to look at some scenarios, generated during the interviews and workshops, for possible future horticultural production in Wales.

4.2 Fruit and vegetable requirement calculations, Wales

At present there is no systematic planning at a population level in relation to secure and sustainable diets in the UK. This thesis presents the first research on the population fruit and vegetable requirement of Wales and the UK, though through participatory engagement headline calculations which were shared and publicised before this thesis was written up. This will be elaborated on in the second half of the chapter, but in summary the data appeared before the publication of this thesis in the 'Wales Food Manifesto' (Wheeler, 2016), in infographics presented by 'City Farms', the Community Land Advisory Service and Food Cardiff, in a review of the Welsh Government 'Food Strategy and Action Plan' (Marsden, Morgan and Morley, 2016), in a Record of Proceedings for the National Assembly for Wales (2017b) in Veg Facts (Food Foundation, 2016c) and 'Farming for the Future of '5 a day'' (Food Foundation, 2017). This thesis however represents the first detailed publication of the exact methodology and detailed rationale behind the calculations.

There are obviously fruit and vegetable requirements beyond absolute nutritional requirements: people's requirement for culturally appropriate fruit and vegetables for example. This thesis however concentrates on the population's nutritional requirement, according to accepted public health policy, as there is a gap in the research in relation to what it is and what the benefits and drawbacks of using it might be. This is not to say that the multi-functionality of food (Morgan, 2015) is not important to the debate and that other requirements in relation to fruit and vegetables should be considered, but that this research seeks to explore what happens when nutritional requirements are used to plan at a population level. The limitations of this approach are explored in the discussion. At the outset of this research there was no established methodology for calculating the population fruit and vegetable requirement. The process of the participatory research for this thesis, in part, helped to test and to validate the methodology for calculation with relevant stakeholders.

Initially the term 'fruit and vegetable needs' was used, but during the process of research it was suggested by the Food Foundation, a civil society organisation supporting systemic change for better public health nutrition, that the term 'requirement' better reflected the terminology of nutritional requirements in general. It also better portrayed that there are actual amounts of fruit and vegetables that a population requires in order to maintain health, according to dietary recommendations, rather than needs for other reasons such as cultural preferences. The term 'fruit and vegetable requirement' was consequently trialled and then adopted after positive response from stakeholders.

As discussed in Chapter 2 (Literature review), the public health recommendation during the first phase of the research was that adults should eat '5 a day' and this changed during the research period to *at least* five portions, or '7 a day' (PHE, 2016b). That the public health recommendations are judgemental rather than epidemiological, as outlined in the literature review, and are changeable, begs the question as to whether it is wise to base calculations on them. For the purposes of this research it was considered a useful starting point given that these are the governmental recommendations (Morgan, 2008, Schoen and Lang, 2016).

Initially crude calculations, based on total Welsh population regardless of age, requiring '5 a day' (400g), were used to establish fruit and vegetable requirement. As

part of the rationale for using the fruit and vegetable requirement to compare to production capacity and production possibilities, it was decided to express the fruit and vegetable requirement as an annual amount, see Figure 30:

Initial crude calculation
400g x 365 days x total population (3.1m)
= 452,600 tonnes per annum (tpa)

Figure 30. Initial crude calculation of fruit and vegetable requirement.

During research and engagement with stakeholders, however, it became clear that there was a desire for a more accurate calculation. One producer and distributor commented: “But your figures include everybody, even babies, so they are not accurate” and another NGO stakeholder commented: “Children eat less fruit and vegetable than adults so you need to adjust the calculation”. In order to ensure credibility, and in line with PAR, the figure was re-calculated, taking out under-one-year-olds and using guidance on children’s portions from ‘The Children’s Food Trust Early Years Setting Guide’ (School Food Trust, 2012), 40g for 1–5 year olds, and the ‘England School Food Plan’ (School Food Plan, 2015) 40–60g for primary school ages 6–10 years. This was interpreted as follows in Figure 31:

Age group (years)	Fruit and vegetable requirement grammes (g)/day	Fruit and vegetable requirement tpa ‘5 a day’ per person
0–1	0	0
1–7	200g (40g x 5)	0.0730
8–10	300g (60g x 5)	0.1095
11+	400g (80g x 5)	0.1460

Figure 31. Fruit and vegetable requirement, ‘5 a day’ per age group.

The fruit and vegetable requirement (‘5 a day’) of the Welsh population, using 2015 mid population estimates (StatsWales, 2016), therefore calculated to 425,387 tonnes per annum. This represented how much fruit and vegetables should be eaten by the

Welsh population according to governmental public health nutritional policy, pre-March 2016, see Figure 32 below:

	0–1yrs	**1–7yrs**	**8–10yrs**	**11+yrs**	**Total population**
Wales population 2015, (StatsWales , 2016)	33,542	251,719	104,287	2,709,538	3,099,086
Fruit and vegetable requirement '5 a day' tpa	0	0.0730	0.1095	0.1460	
Fruit and vegetable requirement tpa (pre waste)	0	1,8375.487	11,419.4265	395,592.548	425,387.4615 = 425,387 (correct to the nearest tonne)

Figure 32. Wales fruit and vegetable requirement '5 a day', pre waste.

4.2.1 Fruit and vegetable requirement and waste

If there were no fruit and vegetables wasted in the supply chain or in the home, then for 425,387 tpa to be eaten, 425,387 tpa would have to be available. However, data shows high levels of fruit and vegetable wastage in the supply chain and in the home; though the data is variable. For the requirement to be a realistic figure in terms of feeding the population healthily it was considered important to include an estimation of likely waste and to factor this in to calculations.

According to the Department for Environment Food and Rural Affairs (Defra, 2015b) and based on figures from the Food and Agriculture Organisation (FAO, 2011), fruit and vegetable waste in the EU and Russia is 46%, with 20% occurring at production, 5% at post-harvest storage, 2% at packaging and processing, 10% at distribution and supermarket and 19% at consumption. Waste and Resources Action Programme (WRAP) data suggests UK household fruit and vegetable waste is higher at 32% of

that purchased, of which half is avoidable (WRAP, 2014). UK supply chain loss data shows variability also. According to WRAP (2011) total supply chain waste varies greatly between vegetables, with lettuce averaging 12%, tomato 19%, onions 42% and broccoli 28%. WRAP (2016) estimate fruit and vegetable processing waste to be 8% and Defra estimate total supply chain waste to be 12% (Defra, 2015b). Given the variability in the waste data, a decision had to made as to how much waste to include in the fruit and vegetable requirement. To not include any at all would mean that if the fruit and vegetable requirement were produced it would be insufficient to meet recommendations. Another option was to include only unavoidable waste, for instance as defined by WRAP. In terms of household waste this figure is estimated to be 16% of all fruit and vegetable purchased and 28% of supply chain total fruit and vegetable waste (WRAP, 2016). However, as one producer stakeholder pointed out, it is not realistic to assume that no fruit and vegetables will be wasted apart from what is completely unavoidable: “You mean well but then you find [the leek] in the back of the fridge and then you take off the outside and the end…” Total waste estimates outlined above vary then at least between 26% and 46%. The figure of 35% fruit and vegetable waste was chosen for this research to reflect the current realistic UK scenario; this also reflected levels of food waste more generally cited at approximately a third (WRAP, 2015a, FAO, 2011). This was not popular with all stakeholders, some thinking the waste level in the calculation should reflect current waste. One small-scale producer stakeholder commented: “I don’t think 50% UK waste is that unrealistic you know”. The problem of including high levels of waste in the requirement calculation is that unsustainably high levels of waste become accepted and normalised in the model and this may inadvertently support current levels of waste. At 35% waste, to consume 425,387 tpa, 654,442 tpa would need to be available at the farm gate, meaning 229,055 tonnes extra would need to be produced per year to be wasted. Some stakeholders thought this level was too high and that it should be adjusted in line with waste reduction targets. When the requirement was adapted for use in Veg Facts (Food Foundation, 2016c) they assumed 29% household vegetable waste (WRAP, 2016) and 12% supply chain waste (Defra, 2015b) giving a total of 41% and then halved it to 20.5%, in line with the Sustainable Development Goal to reduce supply chain and household waste by 50% by 2030 (United Nations, 2016). In practice 20.5% was rounded down to 20% waste.

The 35% waste figure was adopted for the purposes of calculating the fruit and vegetable requirement for this research. It represents an estimate of current waste not a target for waste reduction and needs be treated with some caution. The aim was to explore the fruit and vegetable requirement with stakeholders in relation to production and to some extent the amount of waste included is not overly relevant given the huge difference between the requirement and fruit and vegetables currently being produced in Wales, as discussed in the next sections. However, if the fruit and vegetable requirement was to be adopted more widely it would be advisable for a more detailed analysis on the most relevant fruit and vegetable waste data to be included. This research could be conducted by WRAP or Defra, for instance.

4.2.2 Fruit and vegetable requirement to land, fruit and vegetable yields

Following consultation during research, the fruit and vegetable requirement of the Welsh population was adjusted to be 654,442 tpa. The figure initially presented to stakeholders in Wales, and used to stimulate discussion, was 620,000 tpa. Because the aim of the research was to bridge the gap between public health and consumers and other aspects of the food system, specifically production, it was thought relevant to convert the fruit and vegetable requirement to land needed to produce the requirement. Whether this was a useful tool is discussed later. This section outlines how the fruit and vegetable requirement was converted to land and the assumptions that the calculations were based on.

In order to convert requirement to land, some assumptions of yield had to be made. Data from the standard UK farm management handbooks for organic (Lampkin, Measures and Padel, 2014) and non-organic or so called ‘conventional’ fruit and vegetable production (Nix, 2014) were compared along with data on yields from the Horticulture Wales Crop Calculator and yield data from ADAS (a UK independent provider of agricultural and environmental consultancy, rural development services and policy advice) (see Appendix 1).

The overall yield average figures assume that equal amounts of a range of fruit and vegetable are produced. This is unlikely to be the case given that consumption of each fruit or vegetable varies. One way of getting around this would be to base the calculations on the ratio of fruit and vegetable currently consumed (a method used by

Plassman and Edwards-Jones (2007)) or on the proportions of fruit and vegetable recommended for a model healthy diet such as the ‘Livewell’ model diet (WWF-UK, 2011). Both of these methods were considered to be less than ideal, current consumption being too far from recommendations and a model diet potentially too specific thereby skewing results. Also, the limited yield data available made it difficult to carry out these calculations. Another way to calculate it would be to use current production proportions. Unfortunately, data on hectarage or tonnage of fruit and vegetable grown in Wales is not collected, probably given the small proportion of land currently under horticultural production in Wales, so it was not possible to estimate an average yield from actual production statistics. This type of data would be useful, especially given the importance of fruit and vegetables to public health, and a recommendation of this research would be that more detailed horticultural statistics should be collected in Wales in the future. Fruit and vegetable production data for UK, Scotland and England (Defra, 2015c) is available, and from this, overall yield can be calculated at approximately 20 t/ha (2,780,000 tonnes vegetables and 434,000 tonnes of fruit being grown on 161,000 hectares). An NGO stakeholder based in Scotland reported, during their interview, that they used 20 t/ha as standard in their fruit and vegetable possible production calculations.

The limited yield data specific to Wales is available, and ranges from 12.8 t/ha from Horticulture Wales crop calculator to 14.8 t/ha from ADAS. The UK data from the farm management handbooks ranges from 18.4 t/ha for organic production and 26 t/ha for non-organic. Average yield overall was 18 t/ha. Yield data does not comprehensively cover all fruit and vegetables, and the level of production is at field scale only. This may be problematic in terms of comparability to yields in Wales where there are a high number of small-scale producers using mixed cropping techniques, though land area under this form of cultivation still remains small. There is a lack of data on mixed-cropping yields of smallholders and in order to provide a clearer indication, extra yield data was collected by producer stakeholders at Lammas Eco Village (West Wales). Over a period of four years, three small holders weighed all fruit and vegetables harvested on a daily basis. The production area was calculated and weights checked by the researcher. One producer interviewed, who was also in the process of building their own house, achieved organic yields of 12.4

t/ha in 2011, 5 t/ha 2012 (a wet summer), 15.4 t/ha in 2013 and 15 t/ha in 2014. As an illustration, Figure 33 shows yield data for 2014:

Fruit/vegetable	Weight (kg)
Pumpkins	24.8kg
Peas	1.2kg
Parsnip/turnip	24.0kg
Jerusalem Artichoke	35.0kg
Cabbage	18.5kg
Chard	22.0kg
Kale	10.5kg
Salad	28.0kg
Purple Sprouting Broccoli	2.0kg
Radish	1.0kg
Rhubarb	5.0kg
Mangetout	3.0kg
Potatoes	216.0kg
Strawberries	19.0kg
Raspberries	27.0kg
Cucumbers	64.4kg
Tomatoes	77.17kg
Broccoli	2.39kg
Kohlrabi	6.6kg
French beans	13.39kg
Blackcurrants	48.12kg
Courgettes	141.79kg
White currants	0.14kg
Squash	42.7kg
Carrots	22.62kg
Cauliflower	6.05kg
Blackberry	8.5kg
Apples	31.0kg
Quince	1.2kg
TOTAL	903.07kg
YIELD (0.06 ha)	15.05 t/ha

Figure 33. Lammas eco-village small-holder 2014 fruit and vegetable yields.

Caution has to be taken with these yield estimates as they are self-reported and may contain inaccuracies. However yield estimates in the standard farm management handbooks (Lampkin, Measures and Padel, 2014, Nix, 2014) are often based on producer reports so this is not unusual. What this data does provide is data specific to Welsh growing conditions and to the types of production that SME producers might achieve. Additionally, qualitative evidence from other small-scale producers during the interview process suggested that yields, of a mixture of fruit and vegetables, between 10–15 t/ha were realistic for Wales. The data then from the different sources are broadly consistent that Wales's average fruit and vegetable yield is likely to be in the range of 10–20 t/ha.

During the research, three yield estimates were trialled with stakeholders to ascertain what yield levels they thought should be used to model requirement to land, a conservative 10 t/ha, a middle 14 t/ha and a top 18 t/ha. These yields were used to calculate fruit and vegetable requirement to land, see Figure 34 below:

Percentage of fruit and vegetable requirement	Tonnes needed for Welsh population (plus 35% waste)	Area of land required at yield 18t/ha	Area of land at 14t/ha	Area of land at 10 t/ha
100%	654,442	36,358	46,746	65,444
90%	588,998	32,722	42,071	58,900
80%	523,554	29,086	37,397	52,355
70%	458,109	25,451	32,722	45,811
60%	392,665	21,815	28,048	39,267
50%	327,221	18,179	23,373	32,722
40%	261,777	14,543	18,698	26,178
30%	196,333	10,907	14,024	19,633
20%	130,888	7,272	9,349	13,089
10%	65,444	3,636	4,675	6,544
5%	32,722	1,818	2,337	3,272
3%	19,633	1,091	1,402	1,963
	Horticulture area 2014 (Welsh Government, 2015c)	1,694		

Figure 34. Wales fruit and vegetable requirement to land (654,442 tpa fruit and vegetable requirement).

Figure 34 illustrates that to produce 100% of the fruit and vegetable requirement at 10 t/ha would require 65,444 ha of land, 46,746 ha at 14 t/ha and 36,358 ha at 18 t/ha. There was a divergence between small and large-scale producers in relation to what yield they thought most realistic. Some of the smaller-scale producers, for instance those at the CSA network gathering, indicated that they considered lower yield figure of 10 t/ha to be the most realistic. Some of the larger scale producers considered 20–30 t/ha to be achievable. However, both small and large-scale producers in the majority were happy to use the average yield of 18 t/ha as a realistic estimate for what might be achieved in Wales given different production methods. This was also backed up by consensus on average yield in the secondary literature.

As the research took place over a number of years, the agricultural and horticultural land used to compare to projected land needed for the fruit and vegetable requirement changed due to normal fluctuations in land management. Welsh agricultural statistics published annually showed that total agricultural land available (including common grazing) went from 1,811,669 in 2014 (Welsh Government, 2015c) to 1,842,878 in 2015 (Welsh Government, 2016) to 1,857,377 in 2016 (Welsh Government, 2018b) and horticultural area went from 1694 ha in 2014 (Welsh Government, 2015c) to 1599 ha in 2015 (Welsh Government, 2016) and to 1628 in 2016 (Welsh Government, 2018b). Figures for the initial research were based on 2014 datasets which were the ones available in 2015 when the calculations were first made. Inconsistency could be claimed, and this is one of the issues for participatory research where research is being shared before analysis and publication. But the nature of these calculations mean that they need updating periodically as the underlying variables change, and this has to be made clear in their dissemination. That the figures changed slightly over the course of the research did not affect the overall implications, discussed in the next and following sections.

4.2.3 Land implications

To put the land needs in context, to produce Wales's fruit and vegetable requirement, using 2014 agricultural statistics, at 18t/ha, it would require only 2% of total agricultural land or 10.5% of Grade 1–3 land[14], see Figure 35. Put simply, it would take only 2% of the land in Wales to grow enough fruit and vegetable for the population to eat '5 a day'. It would therefore take very little change in overall land use and even less to grow a smaller percentage of '5 a day'; for example, to grow 50% of the fruit and vegetable requirement would require only 1% of the land and so on. See Figure below:

Percentage of fruit and vegetable requirement	**Tonnes needed for Wales fruit and vegetable requirement including 35% waste**	**Area of land required at 18t/ha**	**Percentage of total agricultural land available 1,811,669 (Welsh Government, 2015b)**	**Percentage grade 1–3 land 345,839 (Plassman and Edwards-Jones, 2007)**
100%	654,442	36,358	2.0%	10.5%

[14] for explanation of Grades refer back to Figure 20, Chapter 2 (Literature Review)

90%	588,998	32,722	1.8%	9.5%
80%	523,554	29,086	1.6%	8.4%
70%	458,109	25,451	1.4%	7.4%
60%	392,665	21,815	1.2%	6.3%
50%	327,221	18,179	1.0%	5.3%
40%	261,777	14,543	0.8%	4.2%
30%	196,333	10,907	0.6%	3.2%
20%	130,888	7,272	0.4%	2.1%
10%	65,444	3,636	0.2%	1.1%
5%	32,722	1,818	0.1%	0.5%
3%	19,633	1,091	0.1%	0.3%
	Horticulture area 2014 (Welsh Government, 2015c)	1,694		

Figure 35. Welsh fruit and vegetable requirement to land (654,442 tpa fruit and vegetable requirement).

In 2014 fruit and vegetables were produced on only 0.1% of land in Wales. As a number of stakeholders pointed out, these figures do not include land not on agricultural holdings; for example, some urban community gardens and back gardens. Comments illustrative of this were: “but 0.1% doesn’t include all the community gardens and allotments and so on” and “in Wales it is hard to measure the horticultural output of all the fringe things going on”. Neither ‘City Farms’ nor the Community Land Advisory Service in Wales systematically collect data on land area under cultivation by community growing projects and it is a recommendation that they, and other horticulture related umbrella bodies, might do so in the future. In terms of gardens and allotments, according to the Family Food Survey (Defra, 2015a, p.9) only 3.1% of fresh fruit and vegetables consumed come from such sources. Though self-reported production and consumption figures are known to show a large margin of error, it is likely that household production is low, particularly when compared to population requirement. There may be more comprehensive data on home production yields available in the future through the ‘MYHarvest’ (Measure Your Harvest https://myharvest.org.uk) project being run by Sheffield University.

4.2.4 Requirement to consumption implications

In 2014, 1694 hectares in Wales were reported as growing fruit and vegetables (Welsh Government, 2015c) and assuming an average yield of 18 tonnes per hectare meant that Wales was producing around 30,492 tonnes. This sounds like a large amount but when it is compared to actual consumption and requirement it is not, as this section explains.

There is not a comprehensive dataset on consumption for Wales; though the 'National Diet and Nutrition Survey' has recently had a sample boost for Wales, a recommendation would still be that more comprehensive data is collected. The Welsh Government survey (2017b) indicates the number of people reaching '5 a day' has gone down to 24%. Data from the 'The Living Costs and Food Survey' published in the Family Food report (Defra, 2016b, Defra, 2015a) puts average purchase in Wales at 3.5 portions per person per day[15] (316,727 tonnes per annum for the total Welsh population of 3,099,086). After 'unavoidable' and 'possibly unavoidable' household waste of 20% (WRAP, 2014) consumption more likely to be in the region of 2.8 portions. If we round this up to three portions (240g), this translates to a likely consumption of around 271,480 tonnes.

If we then compare this to production we see that Wales is producing just over 10% of the amount that is consumed, the rest coming from other parts of the UK, the EU and beyond. If we compare production to requirement we see that Wales's production is only 5% of what is advocated to be eaten by public health '5 a day' guidelines. As some stakeholders commented "Wales has a fruit and vegetable deficit both in terms of consumption and production". It is also the case that Wales may have a deficit in terms of availability. It is not possible to calculate this at present as data on actual amounts of fruit and vegetables accessible in Wales is not collected; a recommendation would be that these data are collected in the future. However, data on fruit and vegetable availability at a UK level are collected, and when compared to the UK fruit and vegetable requirement reveal a deficit, as detailed in section 4.3.

4.2.5 'Eatwell Guide' 2016 implications, '7 a day' (554g)

[15] This does not include composite foods and fruit and vegetables eaten outside the home but these amounts are likely to be low 'Family Food' estimates fruit and vegetables eaten out as 8.4g per person per day.

Near the end of the research phase for this thesis the governmental healthy eating guidelines were updated from ‘5 a day’ (400g) to ‘7 a day’ (554g) (PHE, 2016b). This obviously increased the fruit and vegetable requirement of the Welsh population and the calculations (see Figures 36–38 below) for the ‘7 a day’ show that the requirement changed from 654,442 tpa for ‘5 a day’ to 916,219 tpa for ‘7 a day’ (including 35% waste).

Age group (years)	**Fruit and vegetable requirement grammes (g)/day**	**Fruit and vegetable requirement tonnes per annum (tpa) ‘7 a day’ per person**
0-1	0	0
1-7	280g (40g x 7)	0.1022
8-10	420g (60g x 7)	0.1533
11+	560g (80g x 7)	0.2044

Figure 36. fruit and vegetable requirement, ‘7 a day’ per age group.

	0–1yrs	**1–7yrs**	**8–10yrs**	**11+yrs**	**Total Population**
Wales population 2015, (StatsWales , 2016)	33,542	251,719	104,287	2,709,538	3,099,086
Fruit and vegetable		0.1022	0.1533	0.2044	

requirement '7 a day' tpa					
Fruit and vegetable requirement tpa		25,725.6818	15,987.1971	553,829.5672	595,542.4461 = 595,542 (to nearest tonne)

Figure 37. Wales fruit and vegetable requirement '7 a day' pre-waste.

Percentage of fruit and vegetable requirement	**Tonnes needed for Welsh population including 35% waste (correct to nearest tonne)**	**Area of land required at yield 18t/ha**	**Percentage of total agricultural land available 1,811,669 ha**	**Times more land needed to produce fruit and vegetables than present (to nearest whole number)**
100%	916,219	50,901	2.81	30
90%	824,597	45,811	2.53	27
80%	732,975	40,721	2.25	24
70%	641,353	35,631	1.97	21
60%	549,731	30,541	1.69	18
50%	458,110	25,451	1.40	15
40%	366,488	20,360	1.12	12
30%	274,866	15,270	0.84	9
20%	183,244	10,180	0.56	6
10%	91,622	5,090	0.28	3
5%	45,811	2,545	0.14	2
3%	27,486	1,527	0.08	1
	Horticulture Area 2014 (Welsh	1,694		

	Government, 2015b)			

Figure 38. ‘7 a day’ Fruit and vegetable requirement to Land (916,219 tpa fruit and vegetable requirement including 35% waste).

The land implications are that it would require 2.8% rather than 2% of total agricultural land to provide ‘7 a day’. Because the recommendations changed after the stakeholder interviews and workshops, this information was not presented; but it did not change the overall implications of the research that production is well below requirement and it would take relatively very little of total land to produce it; though a lot more than currently under cultivation: 21.5 to 30 times more. The increase made a difference during participatory engagement on Peas Please, post March 2016, and ‘7 a day’ was used to calculate the UK fruit and vegetable requirement for documents prepared with the Food Foundation as outlined in the next section.

4.3 UK fruit and vegetable requirement to availability

When engaging with stakeholders beyond Wales it became necessary to calculate the UK fruit and vegetable requirement; this also helped set the Wales context and to establish whether there was enough fruit and vegetables in the system for the UK population to meet public health recommendations. Without having established the fruit and vegetable requirement this would not be possible.

The UK fruit and vegetable requirement was calculated using the same methods to calculate the Wales ‘7 a day’ fruit and vegetable requirement. It came out as 18.6 million tonnes per annum at 35% waste or 15.1 million[16] tonnes per annum at 20% waste. The reason here for incorporating two waste figures is that the Food Foundation, who engaged with this research, preferred to use the lower figure.

Total availability, production and imports, minus exports in 2014 was only 8.8 million tonnes (Defra, 2015a), showing a UK fruit and vegetable deficit of 6.3–9.8 million

[16] This calculation is based on UK population Office for National Statistics 2015a. Annual mid-year population estimates, UK: 2014. of 64,596,700 minus 0-1 yr olds giving 63,818,449. 1-7 yr olds on 280g per day, 8-10 yr olds 420g and 11+ yr olds 560g.

tonnes. This means that there are currently not enough fruit and vegetables in the system for the UK population to meet its ‘7 a day’ requirement (or ‘5 a day’).

If the UK maintained the current home production to import ratio (57% home production for vegetables and 18% for fruit as percentage of supply (Defra, 2016c)) it would still need to produce around 2.4–3.7 million tonnes per annum more to fulfil the requirement. What this could involve in practice in terms of land, businesses, labour and financial output is elaborated on in the scenarios section (4.5) of this chapter, along with a Wales future fruit and vegetable production scenario.

4.4 Results of stakeholder engagement with requirement

4.4.1 0.1% of land growing fruit and vegetables in Wales

In terms of stakeholder reaction to the statistics there, was general surprise that Wales produces so little fruit and vegetables. Stakeholders who were not producers were more likely to be surprised that so little fruit and vegetable is being produced in Wales. A stakeholder, at the Plaid Cymru Green fringe event workshop, commented:

> “Doedd gen i ddim syniad bod cyn lleied o lysiau a ffrwythau yn cael eu tyfu yng Nghymru - ond 0.1% o'r tir amaethyddol! Mae'n syniad gret i drio ehangu'r sector yma: yn fasnachol, ym gymunedol (gerddi cymunedol, rhandiroedd ac ati) ac hefyd yng ngerddi pobol, gartre.”

Translated into English this reads:

> “I had no idea that so few vegetables and fruits are grown in Wales - 0.1% of agricultural land! It’s a great idea to try to expand this sector: commercially, in the community (community gardens, allotments, etc.) and also in the gardens of people, at home.”

Another NGO stakeholder commented: “Your figures, honestly it stunned me. 0.1% of the land growing fruit and veg in Wales is a staggeringly small amount”. In terms of food production, Wales has become synonymous with the production of meat and dairy products, and as such horticulture has been side-lined and perhaps seen as something that is not as possible in Wales; as illustrated by this comment from a producer support organisation: “Wales is good at growing livestock and not much else”. Another comment illustrative of this comes from the Climate Change,

Environment and Rural Affairs Committee Inquiry into the future of land management in Wales. In response to a question about the possibilities of growing more fruit and vegetables, NFU Cymru spoke of the challenge of doing so in Wales because of the nature of the soil in some areas:

> "For certain parts of Wales the soils are a bit thin, especially in mid Wales and parts of Pembrokeshire where I live. Some of the soil we've got is only about three or four inches and that's not because it's washed away because, always in my lifetime, it's grass that's been growing on it, so it's not washing away." (National Assembly for Wales, 2017a, p.57)

The perception that suitable land availability is an issue was also the opinion of an influential report, published by the Centre for Alternative Land Use (CALU) in 2007 called 'Scoping the environmental and social footprint of horticultural food production in Wales' in which the authors claimed that:

> "The results of this analysis suggest that even if all suitable land was used for the production of vegetables and salad stuffs, the volumes produced would fail to meet current consumption. Given that there are significant health benefits associated with the consumption of fruit and vegetables, it is imperative that fresh produce enters Wales." (Plassman and Edwards-Jones, 2007, p.82)

and:

> "For field vegetables, this analysis shows that the area currently grown within Wales represents about 10 % of the total area needed to meet Welsh consumption; while for apples and pears, this figure is 26.9 % … If we assume that all potatoes are grown on Grade 2 land, which is possible, then Welsh horticulture would need to utilise all current Grade 1 land, in addition to a further 820 ha of Grade 1 land, in order to achieve self-sufficiency in vegetables." (Plassman and Edwards-Jones, 2007, p.81)

Given that the Plassman and Edwards-Jones report backs up a commonly held belief among some that Wales cannot grow enough fruit and vegetables for its requirements, its conclusions are considered further. It illustrates the 'can't-do' attitude in some circles and contrasts with the 'can-do' attitude of many stakeholders; particularly producers, large and small-scale, 'alternative' and 'mainstream', as outlined in this section.

Plassman and Edwards-Jones claim that the fruit and vegetable requirement of the Welsh population (2001 population of 2,903,085), according to National Diet and Nutrition Survey consumption statistics is 114,841 tpa, see Figure 39:

Fruit and vegetable group	Fruit and vegetable	Consumption in t/year	Average yield in t/ha	Hectares needed to meet consumption
Peas		8914	4.1	2174
Green beans		3155	7.7	410
Raw and not raw carrots		8578	63.6	135
Other raw and salad vegetables		17002	24.3	700
Other vegetables	Cauliflower	22045	13.6	940
	Onion		33.3	
Leafy Green Vegetables	Sprouts	10520	13.3	603
	Broccoli		9	
	Cabbage		30	
Raw and not raw tomatoes	Tomatoes	17685	268	66
Apples and Pears	Apples	26942	18.1	1489
	Pears		13.2	
TOTAL		114,841 tpa	Average yield 17.6 t/ha (114,841/6517)	6517

Figure 39. Adapted from Table 32 (Plassman and Edwards-Jones, 2007, p.82).

The 114,841 tpa figure does not allow for any waste in the supply chain or in the home. If we compare this to the pre-waste 425,387 tpa outlined in this thesis and based on a population of 3,099,086 we can see that it is a lot less: an average of 0.04 tpa per person compared to 0.14 tpa per person. 114,841 tpa would have only been sufficient to meet only 27% of the '5 a day' population requirement of 2001, not including waste which would have reduced this figure further. Although the yield is calculated differently, by using consumption data and specific yield data for those fruit and vegetables, the average yield is 17.6 t/ha, very similar to the 18 t/ha used in this thesis. Overall land required according to Plassman and Edward-Jones would be 6,517 hectares compared to 36,358 hectares here calculated for '5 a day'. The total

of 6,517 hectares represents just 0.4% of the land considered available at the time of their publication, less than the 2% here stated. Yet the report gave a negative spin on production potential, partly based on an economic assessment of profitability: “In order to obtain maximum yields and minimum costs of production, field vegetables should ideally be grown on Grade 1 land” (Plassman and Edwards-Jones, 2007, p.82). Given that there was only 4,142 hectares of Grade 1 land, according to the Agricultural Land Classification data in Wales (see Chapter 2 (Literature review)) then the report concluded it would not be possible for Wales to grow enough to meet consumption. There is a neo-productionist spin on this conclusion which feeds in to the food security narrative that has dominated UK and Welsh Government policy development. However, the assumption in this thesis, is that Grade 1–3 (excellent, very good and good to moderate) land, at least, is suitable for fruit and vegetable production. This comes from the research with stakeholders and from the underlying philosophy that sustainability, in its broadest sense, is important and therefore aspects of sustainability other than economic, such as environmental and public health and social, should be considered in the assessment of fruit and vegetable production viability. This may have been an issue for the credibility of the fruit and vegetable requirement to land calculations, for some, and this is explored further in Chapter 7 (Discussion).

A number of producer stakeholders interviewed claimed to be making a living growing vegetables on Grade 4 land; these tended to be small-scale producers, often using organic methods. These comments from small-scale producers help illustrate the point: “Our land is Grade 4 but we are still producing well”, “It is a well-known observation that organic growers often grow on the worst land because it is the only land they can afford to use, and they make it work” and “But you don’t need arable land, we are [growing] on what was permanent grass.”

Producers, of all scales, generally agreed that land was not an issue holding back production in Wales. One large-scale producer commented that they are often told “we are the poor relation [with regards to horticulture]. We don’t really do that in Wales”. However, he reflected: “But we have the potential to do all of it” and:

> “I think it is feasible to grow anything we want. I have always said that. You get farmers sometimes who say you’ll never grow more than 1,000 tonnes of potatoes in

> Pembrokeshire and now we are growing 3,000 and we are still being offered loads of land."

There are obviously some areas which are less suitable for horticultural production such as cold higher altitude slopes; but some producers pointed out that these conditions do not necessarily preclude production, as this quotation illustrates:

> "Climatically there is the slight problem that if you are in e.g. Llandysul, somewhere high up and a bit grim, it's not that you shouldn't have tunnels and grow market garden crops but the viability and the range gets a bit less Tuscany. But there are people in Scotland … I remember being on the Isle of Skye with people growing all sorts of things in walled gardens. One on Rathesy. The dates are all later, the window of lots of choice kind of shrinks a bit but it is still productive … people in Sweden and Scandinavian type countries are still producing lots of crops."

Nine stakeholders volunteered, without prompting, that land availability was not a constraining factor. As one producer stakeholder commented:

> "It is instructive to think of a single crop in context e.g. cucumbers, if the catchment was 10,000 people you could get the stats on how many cucumbers they might eat and that could inform how many you needed to grow, you can produce them in a tiny area the whole catchment could be grown in a little space. When you think of it in those terms it reminds you of how intensive horticulture actually is."

Another small-scale producer stakeholder highlighted that "there are other factors that are more important than land. The time distribution is difficult, seasonality…" and another that "it is not that we haven't got land, that's not the problem. The problem is how to make it work."

A number of stakeholders commented that land which had been previously used for producing food was increasingly being used for other purposes or not being used at all. A stakeholder from mid-Wales commented:

> "Around mid-Wales the land is not brilliant but there is a reasonable percentage of good land; but now it is all being used for biomass (and some fodder) so all the maize nowadays around us is being grown to burn and it is big machinery coming in, not local workers, big lorries coming in to pick up biomass and driving back to the midlands to burn and that has got to change."

Another stakeholder also mentioned "there are thousands of hectares of land that are not used, slightly used, or totally neglected. It would cost a farmer nothing to make some of this land available on some sort of lease." Land availability per se does not then seem to be an issue though there may be an issue for producers gaining access

to land in the first place, particularly small-scale producers. This is illustrated by the experience of the Community Land Advisory Service which was explicitly set up to help community groups gain access to land for community growing. Barriers to horticultural production beyond land and climate were the subject of much discussion by stakeholders and these are described in Chapter 5 (Barriers and Enablers).

4.4.2 How much fruit and vegetables should we produce in Wales?

Despite listing a large number of barriers to production, stakeholders were generally optimistic about increasing the amount of fruit and vegetables grown in Wales. They were presented with the data outlining the fruit and vegetable requirement ('5 a day') to land needs and asked to give their opinion of how much of the requirement should be produced in Wales. Fruit and vegetable food system stakeholders represent those who are likely to be able to give an informed opinion as to potential production but they are also people who have an interest in the fruit and vegetable sector so their answers are likely to be biased towards increasing rather than decreasing sales. They considered that Wales should be aiming to produce 60% of the Welsh fruit and vegetable requirement (three portions a day per person) compared to the current 5%. A more detailed exploration of these views follows.

During discussion it was clear that some stakeholders wanted to provide separate answers to the production potential for fruit and vegetables, mainly because vegetables were considered to be easier to grow in Wales and the UK. Also, there was an understanding of the desire by Welsh and UK consumers for non-UK tropical fruit as illustrated by this comment: "But we love some exotic foods that we'll need to import!"

Not all stakeholders gave a specific percentage, instead preferring to make comment. One large-scale producer said "I think it is feasible to grow anything we want. Certainly, we have plenty of potential in Wales to grow all the seasonal stuff". A small-scale producer commented: "It is quite feasible to think of doing the majority of '5 a day'." Two stakeholders from producer support organisations commented: "Diversifying the production base by strengthening arable and horticultural production, has to be the way to go, and there is massive potential to do so in Wales"

and “I don’t know where you would get to on your scale but there is no doubt there are opportunities out there.”

There was also a recognition that some areas of Wales are better suited for growing horticultural crops than others that there was more horticultural production in the past. A producer support organisation stakeholder commented that:

> “The horticultural industry is very regionally specific, Gower, Pembrokeshire, Llyn…fruit, tree fruit, apples and pears and plums, could be grown in Pembrey and Tywi valley, the borders and the North East of Wales, Wrexham, the sheltered bits of the Gower and Pembrokeshire, the Vale of Glamorgan…”

A small-scale producer from mid-Wales highlighted that “Anglesey was once the breadbasket of the North but now there is virtually no commercial horticultural production on the Island” and another small-scale producer commented:

> “But if you think maybe we could do 75–80% of that ‘5 a day’ in Wales I think that is technically and culturally doable. You could still market a seasonal pattern where it has a big chunk of aubergines and basil and stuff, a significant chunk of the year and you could certainly mess about and say that you can turn basil into pesto and stretch it out for longer. You could still aspire to being a Tuscan peasant for a bit if you like and keep to 70–80%, obviously this assumes you are going to use a fair bit of protected horticulture but you can argue historical precedent for that, glass houses were used for a long time to produce all the stuff that people wanted and was on the edge of climatic limitation.”

Thirty-seven stakeholders gave a specific percentage. In general, it was considered that less of the fruit requirement could be produced in Wales: on average 44%, compared to 73% for vegetables. There were only six stakeholders who gave their answers as fruit and vegetable combined and as one of them indicated 100% this skews the result considerably. However, if all the results are averaged the stakeholders considered that Wales should be aiming to produce 60% of the fruit and vegetable requirement (three portions a day per person), see Figure 40. This is significantly more than the current estimation of 5%.

Figure 40. What % of our fruit and vegetable requirement should we grow in Wales? Average of replies from supply chain stakeholders.

This would involve a considerable expansion of the fruit and vegetable sector, expanding twelvefold from growing on an estimated 0.1% of land (1694 ha) to 1.2% of land (21,830 ha) or 6.3% of Grade 1–3 land.

There was not a significant difference between the answers supplied by small-scale and large-scale producers or 'alternative' and 'mainstream' stakeholders. Though 'mainstream' stakeholders were the ones who were more reluctant to put a figure on it, preferring to say it could definitely be increased but to what extent would depend on the market. There was reluctance among larger-scale producers to set a target without knowing explicit avenues to increase consumption. This might just be a reflection of the relatively greater risk of investment required to produce a crop on a large scale compared to smaller scale.

To some extent this was an arbitrary exercise and the results may have been skewed by the context in which the fruit and vegetable requirement was presented: that Wales produces very little of its current requirement for health. Nevertheless, broadly speaking there was agreement that more fruit and vegetables should be produced in Wales. How this could be facilitated was explored and is discussed in Chapter 5 (Barriers and Enablers). Although the average from stakeholder opinion was that 60% of the fruit and vegetable requirement should be grown in Wales, some found the 100% of '5 a day' production requiring 2% of land a more interesting and useful

figure. For instance, an ex-Assembly Minister interviewed warned against half-measures and commented:

> "Why wouldn't you just go for 100%? It is so small anyhow. I would operate on the basis that therefore if we got commitments from farmers to turn their land over to growing and the Welsh Government would seek 100% and everybody who did would get some sort of annual stipend contribute, that would be part of the policy."

They also commented: "Why not just go for 2% straight off? I can't believe that your idea has not been taken up. If I was still in politics it would have been. It is such a simple message." A number of other stakeholders were also interested in the 2% figure as a policy tool and this is discussed in more detail in the next section.

4.4.3 2% of land to grow '5 a day' for Wales

The statistic that it would take only 2% of the land in Wales to provide '5 a day' to the entire population proved a revelation to some. This is an illustration of one of the positive reactions:

> "This is very clever stuff because it is the art of the possible … Why wouldn't we turn over sufficient land to meet the fruit and veg requirement of the population, when it is so little? Farmers argue that farmers are meeting the dairy and meat needs so why wouldn't they provide for the fruit and veg needs?"

Although most people expressed interest in the figure, there was a mixture of reactions and consequences to its presentation which are discussed in this section. Although most found the information interesting many considered it of little use for them in trying to facilitate change and did not consider it to be transformational. Seventy-two percent of one-to-one interviewees and 25% of workshops overall were in this category and comments are discussed. However, the rest found the figure interesting and useful and some described the statistics as the 'art of the possible' and the 'power of the positive'. In effect the requirement worked as a facilitative policy tool. To an extent, the 2% figure took on a life of its own, in that some stakeholders started to use the figure themselves in documents, posters and discussions in support of promoting horticulture in Wales and this is expanded upon in this section. There was also a snowball effect in that some organisations and individuals beyond the immediate group of stakeholders involved in the research started to quote and use the 2% and related figures in support of the argument to

develop horticulture in Wales. The ones the researcher was made aware of are discussed.

As outlined in Chapter 3 (Methodology) the fruit and vegetable requirement was presented on various platforms to various stakeholders in a variety of settings, one-to-one 39 times, in workshops or events 12 times and on request at a further 11 strands of participatory engagement. After this the avenues for presenting the approach and data ran dry as most stakeholders to do with horticulture and public health nutrition in Wales had come across the research including Welsh Government, Assembly Members and Ministers.

From the 39 one-to-one presentations, the majority of stakeholders (28), 72% said they found the information interesting but not useful, a typical comment illustrative of this was: “To be honest, it is interesting but of no use.” The majority of producers, eight out of nine, also said they found the information interesting but of no use. This was a pattern mirrored in the workshops, where the three out of twelve workshops, which did not result in the fruit and vegetable requirement being used initially, were those with a majority of producers or organisations directly involved with supporting producers. These workshops were the initial Rural Development Plan (RDP) funding bid meeting for horticulture (Tyfu Cymru), the CSA Workshop (Carmarthenshire) and the Growing our Growers event workshop (Pembrokeshire). This was potentially because the fruit and vegetable requirement data did not seem to make it practically easier to overcome the main barriers to horticultural production as outlined in the next chapter; nor did it help to increase sales and consumption. However, through participatory engagement producers at a UK level, including Tyfu Cymru, CSAs, small and large-scale producers did come to use the UK requirement figures to help lobby the UK Government for greater support for horticultural production, this will be discussed in more detail in Chapters 6 (Peas Please) and 7 (Discussion).

One producer support organisation commented that “you have to be very careful that you spell that out that your figures are not commercial” and another that “without increasing demand, farmers can’t produce more. At the end of the day farmers are very adaptable. If they see an opportunity they will act … they are quite reactive. This question very much linked to improving demand.” That the figures were aspirational in a public health sense, and not based on market economics or demand, meant that

they were perhaps of less use and taken less seriously by businesses and business support organisations. However, the one producer stakeholder found the information useful as it 'inspired' them. They commented that "after the stats you did at the Welsh CSA scheme AGM, I felt so inspired that it was all so simple to achieve that I said let's do it". This particular stakeholder went on to start setting up an orchard Community Supported Agriculture scheme.

Eleven interview stakeholders directly went on to use the Wales fruit and vegetable requirement or promote it in some way. Apart from the producer stakeholder mentioned above the other ten comprised: three NGOs supporting the development of the sustainable food environment, four representative bodies and other support/advice providers to food producers, one food education NGO, one ex-Assembly Minister, and one current Assembly Member. These were all stakeholders who were active in supporting policy development and it was this group who found the requirement the most useful and this is discussed more detail in this section.

The fruit and vegetable requirement and land implications were used mostly as a tool to lobby. An enthusiast of the fruit and vegetable requirement was an ex-Assembly Minister:

> "This is great stuff. It is so little that actually it becomes a really good manifesto commitment. This is the sort of thing that I can talk to the agriculture minister about …It is big picture stuff. Clearly if you announced that WG was going to do this then the price of land would go up but if it was something that could be supported through the RDP that would be good … I have been using your stats all over the place. It is the art of the positive and the obvious, why not?"

The rhetoric of the ex-Assembly Minister contrasted markedly with the initial response from the Welsh Government who were interested to hear about the research and sign post but didn't initially engage further. This may have been because the research was suggesting potential futures not offering potential solutions; this is discussed in more depth in Chapter 7 (Discussion). However, as the research developed, and after the Well-being of Future Generations (Wales) Act 2015 (Welsh Government, 2015b) was introduced, and particularly when the Peas Please initiative was launched in Wales, the Welsh Government became active partners and came to support the development of a systemic approach to increasing vegetable consumption through supporting Peas Please in Wales. This is discussed

in detail in Chapter 6 (Peas Please). Public Health Wales also did not engage initially with the fruit and vegetable requirement and the systemic approach. However, later they came to be involved with the Peas Please initiative by offering to facilitate Health Boards in Wales to develop Veg Pledges. They also hosted a presentation by Food Cardiff/ Food Sense Wales, at their AGM in 2018, on Peas Please and a food system approach to public health nutrition; the implications of this in terms of potential social transformation are elaborated on in Chapter 7 (Discussion).

The Food Values event led to an invitation to present the research for this thesis on a new Wales Food Manifesto website, done in the form of a blog titled ‘Beyond ‘5 a day’’ (Wheeler, 2016). It helped to disseminate the research more widely to potential facilitators of change and acted as a useful reference point to the public and other stakeholders.

The Plaid Cymru event workshop led onto an invitation to present the data to the Calon Cymru Network, a community interest company formed for the purpose of encouraging sustainable rural regeneration projects along the Heart of Wales railway line corridor. They were enthusiastic about the research and the implications for planning and land use, perhaps as they were actively involved in big picture thinking about different sustainable futures. This in turn resulted in two pages on the Wales fruit and vegetable requirement and implications for land use being incorporated into a document on Affordable Homes and Sustainable Livelihoods in Rural Wales: feasibility of a resilient neighbourhood in Llandovery (Dodd Racher, 2017).

The ‘City Farms’, the Community Land Advisory Service and Food Cardiff workshops led to further engagement and to those organisations promoting the fruit and vegetable requirement at a number of events, in digital media and posters. They also converted the data into their own posters for use at events. Below are some examples from the Royal Welsh Agricultural Show, 2016:

Figure 41. Wales fruit and vegetable needs infographic poster and display, showing 2% statistic and food system diagram, created by the Community Land Advisory Service and displayed on the Community Land Advisory Service/'City Farms' stall at the Royal Welsh Show, Builth Wells, 2016.

Figure 42. Educational display at Royal Welsh Show, Builth Wells, 2016 created by Egg Seeds with infographics supplied by Food Cardiff based on fruit and vegetable requirement.

One of the snowball effects was that stakeholders not initially engaged with the research heard about it and used it to lobby. For example the CLA, the membership organisation for owners of land, property and business in rural England and Wales (CLA, 2017), came to use the 2% figure to lobby government. They commented:

> "We heard about your research from an ex-Assembly Minister and have found it really useful as a lever for policy around land use. Your research is really interesting and we have been quoting the 2% figure to so many people and using it to lobby Ministers."

Marsden, Morgan and Morley (2016) also quoted the fruit and vegetable requirement research in their review of the Welsh Government's 'Food Strategy and Action Plan'. They recommended an increase in sustainable horticultural production as one of their 15 recommendations and specifically quoted that 2.8% of land should be allocated to horticulture:

> "Significantly more Welsh self-sufficiency could be achieved, by developing the horticultural land base (from its low level of 0.1% to around 2.8% of total agricultural land area, and in tandem developing short horticultural supply chains and retail outlets." (Marsden, Morgan and Morley, 2016, p.19)

This was directly based on the fruit and vegetable requirement research for this thesis, 2.8% of land being the amount needed to fulfil 100% of the population's requirement as stated in an earlier version of the data in 'Beyond '5 a day'' Food Manifesto Blog (Wheeler, 2016).

After the Future Generations Growers conference workshop, a stakeholder commented that:

> "What you are suggesting is potentially transformative. Do you have a timescale for increasing horticultural production? I have experience in lobbying Welsh Government and I would suggest that you should put your evidence to the Rural Affairs Committee."

Partly as a consequence of this, the research went on to be submitted to the 'Climate Change, Environment and Rural Affairs Committee Inquiry into the Future of Land Management in Wales'. The resulting report (National Assembly for Wales, 2017a, p.56–58) summarised contributions on horticulture and health to the inquiry in the following way, "Several academics, the RSPB, the Soil Association and the Organic Research Centre recommended that, in the long term, Wales should aim to expand its range of agricultural produce, including more vegetables and less meat." Also mentioned was that "Stephen Devlin of the New Economics Foundation and Professor Tim Lang, City University, London, said that Wales should produce and consume more vegetables for public health and environmental reasons." The report went on to recommend increasing the amount of horticultural production and sales of fruit and vegetables but did not commit to a target:

> "Recommendation 22. The Welsh Government should work with Welsh food producers, distributors and retailers to increase sales of Welsh produce, including vegetables, and report to this Committee within the next six months on progress."

> "Any future outcomes based system should take into consideration opportunities to increase horticultural production in Wales and other methods of diversification." (National Assembly for Wales, 2017a, p.58)

Following presentation of the research to a Labour Assembly Member, the researcher was asked to present the research to a newly formed cross-party food group at the National Assembly of Wales. This resulted in a Conservative Assembly Member requesting more information on the requirement to availability. He then went on to ask the Cabinet Secretary for Energy, Planning and Rural Affairs: "What is the Welsh Government doing to address the fruit and vegetable deficit in Wales?" (National Assembly for Wales, 2017b). He directly quoted the research from this thesis with the question:

> "We only produce about 10 percent of what we consume, so the deficit is up to 90 per cent, certainly of fruit and veg that can be grown in our climate. With 2 percent of Welsh agricultural land given over to fruit and veg, albeit 10.5 percent of Grade 1 to 3 land, we would actually produce all that we need. So, I do hope that, in any shaping of future policy post Brexit, that we see the importance of this area. We did use to produce more; we should produce more again."

The Cabinet Secretary responded by saying: "There is potential to develop horticulture and opportunity as Wales adapts to Brexit. We recognise the health benefits of fruit and vegetable consumption and have taken action to promote them" and:

> "Yes, I think you raise a very important point and, when we look at Brexit, it's not all doom and gloom – there are opportunities. I think one of the opportunities is that we could perhaps look at the potential different uses of land, if you like, and we've started scoping that work."

She also went on to endorse:

> "…the Peas Please initiative, which was started by the Food Foundation, and that's bringing together farmers and retailers and fast-food outlets, and caterers and processors and Governments, and that really is looking at the supply chain and how we can raise fruit and vegetable production." (see Appendix 3 for full response)

The development of Peas Please is discussed in more detail in Chapter 6 (Peas Please).

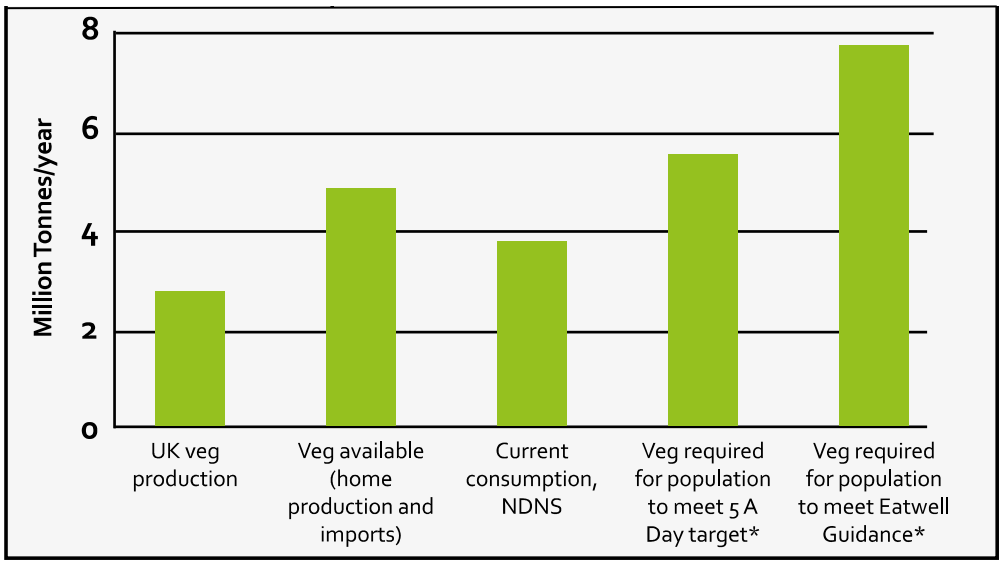
Even though the 2% figure was promoted to Welsh Government from a number of angles, the Government was reluctant to commit to a target either verbally or in any documentation. They did however endorse the idea of supporting horticulture and

fruit and vegetable consumption. One producer thought that the visions set out by the fruit and vegetable requirement might not work in Wales: “This big picture thing, maybe it just doesn’t work in Wales?” There was certainly reluctance for any big picture statistic to be adopted, though it cannot be ruled out that a target might be adopted in the future.

There was a wide dissemination of the research to Welsh stakeholders and a widespread engagement in the research, from grass-roots organisations through to academics and Assembly Members. Engagement more widely in the UK was a spin-off of the participatory engagement and is detailed in the next section.

4.4.4 UK fruit and vegetable requirement stakeholder take-up

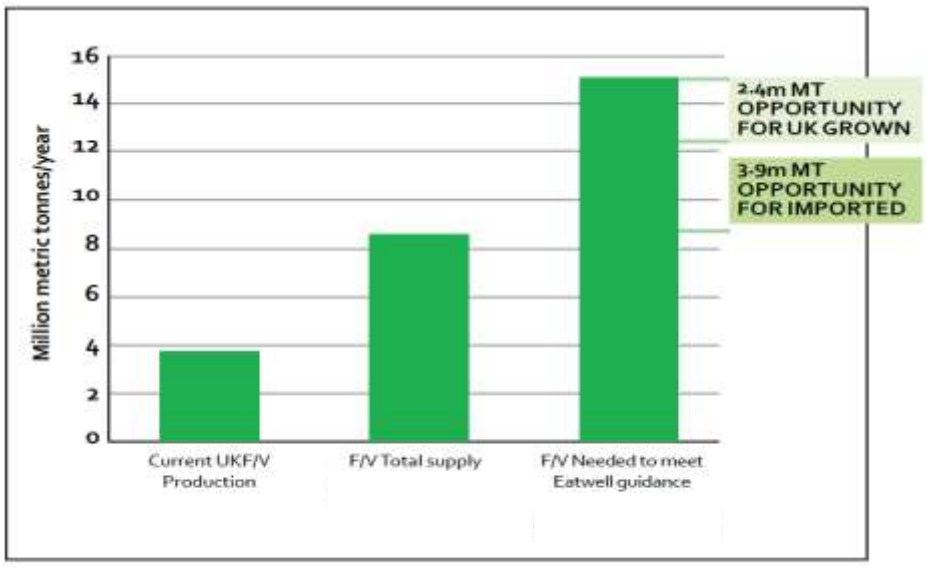
Following discussion of the research for this thesis with the Food Foundation and Nourish Scotland, the researcher came to be involved in a steering group looking at a food system approach to increasing vegetable consumption in the UK (this is discussed in more detail in Chapter 6 (Peas Please)). This participatory engagement involved contributing to and helping to write a Food Foundation briefing paper on Veg Facts as a foundational document for what became known as the Peas Please initiative (Food Foundation, 2016c). Veg Facts sets out vegetable consumption trends in the UK, recommended intakes, how vegetables are consumed and why they should be, affordability issues, and the food system barriers to vegetable consumption as well as whether we are producing enough vegetables. The section on production (Food Foundation, 2016c, p.12–13) includes data on the vegetable requirement of the UK population and is based on the research of this thesis, although the chosen method for the calculation for this publication differed slightly in that it did not exclude 0–1-year-olds and assumed 11-year-olds required 554g and all under-11s 277g per day and assumed 20% waste rather than 35% waste. The results were as illustrated in Figure 43 and show that there are currently not enough vegetables in the UK available to meet the ‘5 or 7 a day’ recommendations.



***Assuming 50% reductions in current levels of household (29%) and supply chain waste (12%). (DEFRA 2015b; Wrap 2012a; Wrap 2016; DEFRA 2014b; ONS 2016b; Public Health England 2014)**

Figure 43. UK vegetable production and requirements table from Veg Facts (Food Foundation, 2016c, p.12).

As part of the Peas Please initiative, the Food Foundation went on to incorporate research from this thesis on the UK fruit and vegetable requirements into their Farming for the Future of '5 a day' briefing (Food Foundation, 2017), see Figure 44:



Source: (Wrap 2016; DEFRA 2015b; Wrap 2012a; data prepared by Amber Wheeler)

Figure 44. UK fruit and vegetable production, availability and '7 a day' requirement (Food Foundation, 2017, p.15).

Their report couched the requirement in terms of presenting an opportunity should demand be increased in line with recommendations:

> "This represents a market opportunity for British horticulture of 2.4 MT, equivalent to a 66% growth in British production. This amounts to growing output from the sector from just under £2 billion per year to £3.3 billion (DEFRA, 2017). This creates a potentially huge opportunity to not only increase production of existing varieties but to expand the number of varieties grown to maintain consumer interest and engagement in British produce." (Food Foundation, 2017, p.15)

The UK fruit and vegetable requirement was also shared with the Food Research Collaboration who asked for the researcher to submit a briefing paper on the matter. However, the research came to be incorporated into Peas Please and Food Foundation briefings and publicised widely in the UK, and this took precedence at the time.

Updated data on requirements was also instrumental to the development of a new Fruit and Vegetable Alliance in the UK, one of the recommendations outlined in more detail in Chapter 5 (Barriers and Enablers) of this thesis and discussed in more detail in Chapter 6 (Peas Please).

4.5 Scenarios

Using the requirement offers the opportunity to vision and model how, in a broad sense, fruit and vegetables could be produced in Wales and the UK. Visioning and scenario building, using a PAR approach, were a particular focus in five interviews and workshops with the Wales Community Supported Agriculture (CSA) Network, a CSA near Llanelli, a CSA near Cardiff, Food Cardiff and a large-scale producer and distributor. Findings are reflected on here.

Using the fruit and vegetable requirement to model was useful to contextualise potential production contribution; particularly for those putting forward alternative models based on small-scale production, for instance CSA schemes. At the Wales CSA Network AGM 2015, 20 stakeholders took part in a workshop on the fruit and vegetable requirement and how much could and should be produced by CSA schemes in Wales. The '5 a day' Wales population fruit and vegetable requirement figure of 620,000 tpa was used as a basis for scenario exploration at the time. After

consideration of potential yields the CSA stakeholders preferred to use 10 t/ha, as opposed to the higher 18 t/ha used for the land need calculations for this thesis, as they perceived it was more realistic given the yields they were currently experiencing. Many of these CSAs were in the early stages of development and as such were likely to be producing less than SME producers with more years of experience, such as some of those for instance outlined in the 'A Matter Of Scale' report (Laughton, 2017). The group decided they would model how many CSAs it would take to produce 100% of the '5 a day' in Wales. At 10 t/ha, an estimated 62,000 hectares of land would have to be under CSA production, almost double than if 18 t/ha average yield were being achieved. In overall land terms this would involve horticultural land going from 0.1% to 3.4% of total land or 18% of Grade 1–3 land, albeit only 5.6% of Grade 1–4 land.

The average size of the CSAs in the workshop was calculated to be just under half a hectare. This was considered to be less than ideal, and hopes were that the average hectarage would increase to at least one hectare, four being promoted at the workshop as a size at which CSAs could be profitable (though obviously this varies). If all CSAs were one hectare then it would take an estimated 62,000 CSAs to produce the requirement for Wales, at four hectares it would take 15,500. There was general shock at these figures and given there were less than ten CSAs operating in Wales at the time, even 15,500 CSAs was considered unrealistic. There was a similar reaction when requirements for Cardiff and Pontyberem were shared in workshops. For Cardiff, calculations suggested that it would take 4,251 CSAs to fulfil the whole of the '5 a day' requirement for Cardiff and 60 for Pontyberem, a small town in Carmarthenshire. Stakeholders commented:

> "I think when you look at the headline figure like that it is mind boggling. The only way forward is to break it down into manageable achievable chunks." (CSA producer)
>
> "[When the researcher] did calculations with us it came out as 60 CSAs needed to supply Pontyberem. That is just unimaginable. But perhaps it would be organised differently then, with more co-operation between producers." (CSA producer)

When engaging with stakeholders on the fruit and vegetable requirement then, particularly the small-scale, one of the consequences was that they realised the scale of the challenge and that there would need to be more co-operation and co-ordination and scaling up of production if the requirement was going to be met in any

meaningful way from small-scale production. The quotations are indicative of the kinds of discussions about upscaling production which the CSA stakeholders engaged in on presentation of the population requirement:

> "Personally, I think we need more mixed farming systems in Wales making use of manure created from livestock." (CSA producer)
>
> "There would be co-ops and that sort of thing if there were more CSAs." (CSA producer)
>
> "There would need to be some co-operation between producers with some large-scale production, in order to deliver the volumes needed." (CSA producer)
>
> "I support the argument that the more people who are doing this the better, because we would collaborate and have an economy of scale." (CSA producer)

A CSA stakeholder, not at the Network workshop, though in response to looking at the requirement, commented:

> "This might be a 15-year plan. In the first 3 years your target is to double production … and then ask yourself what is required to make it happen."

As a practical way forward the CSA Network suggested that one CSA per town might form a more realistic scenario. This, and given higher numbers of CSAs for towns with bigger populations as per Figure 45 below would approximate to 265 CSAs for Wales:

Population	Number of towns/cities in Wales with specified population	Suggested number CSAs or market gardens per town	Total
2,000-10,000	135	1	135
10,000-65,000	56	2	112
100-200,000	2	5	10
300,000+	1	8	8
		TOTAL	265

Figure 45. Possible number of CSAs for Wales; based on 1 CSA per town with greater numbers for larger towns as described.

During the initial research for this thesis (2016–2017) there were estimated to be under ten CSAs in Wales and the hope expressed at the Wales CSA Network AGM was that the sector should be supported to grow. In 2018 the number, according to

CSA Network UK (CSA Network UK, 2018a); was still under ten. Perhaps this is a reflection of the many barriers still being experienced by SME producers, outlined in the following chapter. However, as also discussed in the next chapter, along with other SME producers they provide a number of beneficial services, social and environmental. A number of studies have shown that increasing the diversity of fruit and vegetables available increases consumption (Bucher, van der Horst and Siegrist, 2011, Just, Lund and Price, 2012, Maier-Noth *et al.*, 2016). Small-scale producers are good at producing a diversity of produce (Laughton, 2017). Increasing the amount of fruit and vegetables produced by small-scale producers might positively affect diversity and therefore consumption, as long as routes to market are concurrently developed. Other benefits may include enhanced environmental services, short supply chains benefitting local economies, employment opportunities, improved 'food connection' and education (The Landworkers' Alliance and Growing Communities, 2018). SME producers are an important part of the picture and should not be neglected when it comes to the considerations for the sector as a whole, as has often occurred in the past; for example with those under five hectares being ineligible for CAP subsidies and infrastructure grants.

The Food Cardiff workshop involved small and large-scale producers, as well as support organisations and academics, and looked at the fruit and vegetable requirement for Cardiff and how much should be supplied from in and around the city, Wales, the UK, and further afield. In the workshop the small-scale growers welcomed having a large-scale grower present and the large-scale grower talked about the importance of small scale in terms of the education opportunities it provided. The conclusion of the workshop was that Cardiff should aim to produce '2 a day' (one fruit, one vegetable) from within and around the city.

The large-scale producer and distributor who engaged with the scenario work thought that all of the '5 a day' requirement of 620,000 tonnes could be grown by ten large farms across Wales. At a yield estimate of 18 t/ha that would mean 34,444 hectares being in production by ten farms of around 3,444 hectares each. These would be huge farms; the average size farm over 20 hectares in Wales currently being 98 hectares (Defra, 2017a, p.17). The labour requirement would be less, due to the mechanisation involved in larger-scale production, there would be fewer producer businesses, potentially increasing impact in the event of a business failure.

There would also be potential environmental issues, for non-organic production systems, around increased fertiliser and pesticide use. Upscaling large-scale and small-scale production would likely increase impact around “the use of irrigation water and the use of plastics” (Plassman and Edwards-Jones, 2007, p.i) though a shift to more plant-based production may reduce diet-related greenhouse gas emissions (Green *et al.*, 2015).

As discussed in the literature review, there has been very little planning at a state level in relation to the food system and public health. The fruit and vegetable requirement offers an opportunity to build production scenarios based on combining a broad range of producers, large-scale and SME, to explore a convergent path. This differs from other research in this area which has tended to concentrate on providing a vision which includes one type of production only, for example Fairlie (2007) modelled a diet produced in Britain (including 500g fruit and vegetables) using six different agricultural regimes: chemical, organic and permaculture each separately with or without livestock. Griggs’s (2012) ‘Market Garden Britain’ similarly looked at a production scenario, to 2030 based on ‘5’ (400g) or ‘9 a day’ (720g), where all fruit and vegetables were produced by market gardens. Although helpful for those sectors, it perhaps limits the applicability to Government action plans which are likely to try and encompass different scales and modes of production; though in the past 40 years perhaps large-scale food production has had more influence on policy development in the UK than small-scale.

The next two sections look at ‘1 more a day’ convergent (large and small-scale) production scenarios for Wales and the UK. They are based on critical reflection on the data collected by the researcher. They could be used as a basis for food system planning by stakeholders, in relation to production at least, and could be scaled up; for instance, for a ‘5 more a day’ production the ‘1 a day’ scenario could be multiplied by five. Likely environmental impacts are not investigated here but if more detailed scenario work were to be undertaken this would be recommended.

4.5.1 Wales ‘1 a day’

This section is based on 2014 statistics in common with the other fruit and vegetable requirement calculations in this chapter and on a total ‘5 a day’ population

requirement of 654,442 tpa and 916,219 tpa for '7 a day' (both inclusive of 35% waste). At present Wales is growing around one quarter of a portion per day per head of population. If this was increased fourfold to provide around '1 a day' from Wales, a pretty modest change in terms of contribution to the '7 a day' requirement, in terms of land this would involve the percentage of total land growing fruit and vegetables going from 0.1% (1,694 hectares) to 0.4% (7,272 hectares). Despite being a seemingly small percentage land change, this would represent a major change in the trend of fruit and vegetable production in Wales; land allocated to fruit and vegetables not having risen above 2000 hectares in at least 50 years. It would involve addressing the current barriers to production outlined in the next chapter.

If just 10% of production (of '1 a day') came from small-scale production, 5% from market gardens or CSAs of one hectare in size and 5% from five hectare farms, then there would need to be an estimated 436 small-scale horticulture businesses in Wales. At present, as mentioned in Chapter 3 (Methodology), there is no comprehensive dataset on fruit and vegetable producers in Wales and so the baseline is unknown; but 436 small-scale horticulture businesses is likely to be an increase on current numbers.

Of the remaining 6,544 hectares, if another 30% was produced by the average size Welsh farms (48 hectares) and the remaining 60% by the average farm size of over 20 hectares of 98 hectares (Defra, 2017a, p.17), then this would require another 90 large-scale producer businesses, making 526 businesses in total.

If each CSA or market garden of one hectare employed on average two workers, as the research findings for this thesis suggest is necessary, lower than 3.2 per hectare finding of Laughton's (2017) report but higher than the horticulture labour intensity of 0.24 jobs per hectare as outlined by Devlin (2016), the labour implications would be 3,025 producers and support staff, just under half of whom would be working on small-scale farms. See Figure 46 below:

Scale	Size of producer business (hectares)	Percentage of '1 a day' produced 7,272 hectares	Amount of land (ha)	Number of businesses	Labour needs per ha	Total labour
Very small scale (CSA scheme or	1	5%	364	364	2	727

Market Garden)						
Small scale (small farm)	5	5%	364	73	2	727
Large (average farm size Wales)	48	30%	2,181	45	0.24	524
Large (average farm size of over 20 hectare farms in Wales)	98	60%	4,363	45	0.24	1,047
Total			7,272	526		3,025

Figure 46. Wales production scenario for an extra '1 a day'.

So, although in terms of contribution to overall requirement small-scale producers might offer only a small amount, here 10% of '1 a day', in terms of employment they would offer around 50% of the jobs. There is evidence to suggest that these jobs, although currently not financially very rewarding, offer good job satisfaction; such as "the acquisition and development of skills, the enjoyment of working with others in a pleasant environment and the satisfaction of contributing towards a meaningful goal" (Laughton, 2017, p.26). They also offer a potentially good entry point into the horticultural industry (Soil Association, 2018a).

Financially, if Wales followed the average UK financial output for fruit and vegetable production of £13,000 per hectare (based on Defra (2017a, p.17) statistics), though some research suggests small-scale fruit and vegetable production can achieve higher profits per hectare (Laughton, 2017), quadrupling production would increase financial output from around £22 million to £95 million.

This scenario, for moving from production of '¼ a day' to '1 a day'[17], could be scaled up. For example: '5 a day' production using the above assumptions would result in 36,358 hectares being under production, around 2,631 businesses, employing around 15,125 people, of which 2,181 would be small-scale employing around 7,272 people. Financial output could increase from around £22 million to £475 million. A scenario where all the extra fruit and vegetables that are required are imported would

[17] Per head of population

result in none of the above potential benefits to production, though there might be some supply chain development. This scenario is discussed in more detail in relation to UK supply in the next section.

4.5.2 UK '1 more a day'

This section is based on the UK '7 a day' requirement of 15.1 million tonnes per year (including 20% waste) as discussed earlier in this chapter and calculated based on 2014 datasets. Total availability minus exports in 2014 was only 8.8 million tonnes (Defra, 2015b), showing a UK fruit and vegetable deficit of 6.3 million tonnes per year. This translates to the UK growing just under two portions of fruit and vegetables per head of population and importing just over two portions (though more fruit than vegetables are imported). The figures used by Peas Please and the Food Foundation (2016c, 2017) in Veg Facts and 'Farming for 5 a day' are based on maintaining the current ratio of home production to imports. This amounts to producing 2.4 million tonnes more per year, around an extra portion per head of population per day. This relatively conservative projection for UK production increase would still involve the sector growing by 50%. It translates (at an average yield of 18 t/ha) to 131,250 UK hectares being in production and 8,935 businesses. In terms of labour implications, this might involve 54,600 people employed, 26,250 on small-scale horticulture:

Scale	Size of producer business (ha)	Percentage of '1 a day' produced	Amount of Land (ha)	Number of business-es	Labour needs per ha	Total Labour
Very small scale (CSA scheme or Market Garden)	1	5%	6,563	6,563	2	13,125
Small scale (market garden or small farm)	5	5%	6,563	1313	2	13,125
Large (average	85	30%	39,375	463	0.24	9,450

farm size England)						
Large (average farm size of over 20 hectare farms in England)	132	60%	78,750	597	0.24	18,900
Total			131,250	8,935		54,600

Figure 47. UK production scenario based on ‘1 a day’.

The 28,350 more large-scale horticulture labourers estimated here is based on 0.24 workers per hectare for horticulture as outlined by Devlin (2016). This labour figure per hectare may go down as large-scale producers develop further automation to reduce labour requirement.

To be clear, these calculations represent a considerable projected expansion of fruit and vegetable production but would still involve a doubling of imports and a likely doubling of the fruit and vegetable import value from £4.9 billion (2014 figures) to around £9.8 billion. To meet the ‘7 a day’ requirement around another two more portions per head of population per day would have to be imported, a doubling of imports compared to an increase by half in production.

Whilst most of the stakeholders thought that we should be growing more fruit and vegetables in the UK, there were some who questioned whether we should at all. The likely impacts of a scenario where all of the extra 6.3 million tonnes are imported are touched upon here. As discussed in the literature review, fruit and vegetables already have the biggest trade gap of any food group. If current production levels were to remain static (at just under 2 portions per day per head of population) and all the extra to reach the requirement were imported, equivalent to current import of just over ‘2 a day’ plus an extra ‘3 a day’ per head of population, then imports using 2014 figures and given no expansion in exports, would increase value to around £12.2 billion and UK production value would stay around £2 billion. This represents a significant widening of the gap between production and imports.

To produce another ‘1 a day’ per head of population in the UK the fruit and vegetable sector would likely increase in output, as outlined earlier, by £1.3 billion to £3.1 billion. Producing the extra ‘3 a day’ (just under ‘5 a day’ in total) and not increasing imports, would grow the domestic sector by an estimated £3.9 billion making it worth around £5.9 billion. This would give it a greater agricultural output, at 2016 figures, than UK cattle, sheep and pig meat combined (£5 billion (Defra, 2017a)). Imports of fruit and vegetables would stay around £4.9 billion, reducing the gap between production and imports.

According to a New Economic Foundation analysis of the ‘Food For Life’ schools programme, every £1 spent on local, seasonal produce created more than a £3 return in social, economic, and environmental value before taking the health benefits into account (Kersley, Knuutila and Shaheen, 2011). If this were the case for UK-produced fruit and vegetables, and it was applied to the potential expansion of the fruit and vegetable sector to £5.9 billion, then this in social, economic, and environmental value could result in £17.7 billion worth of benefits *before* the public health benefits of the population fulfilling their ‘7 a day’. There are then large potential economic benefits to increasing UK production which expanding imports would not deliver.

There are many assumptions made in generating scenarios, which perhaps leads to questioning of their validity and usefulness. Given that the underlying variables change, attention to specific figures is unwise. However, taken in a broad sense, they do help in practice to visualise public health recommendations in terms of potential contribution to social, environmental and economic sustainability, and to provide policy guides. The scenarios highlight that there are not enough fruit and vegetables in the UK for the population to meet its requirement; and if it were to be met there would need to be greater availability of fruit and vegetables. Increasing horticultural production in Wales and the UK offers an opportunity to grow the output of the agricultural industry significantly, whilst delivering other social benefits, which increasing imports alone would fail to do. The scenarios outlined in this chapter are a useful starting point.

4.6 Reflection on research questions

This thesis, as set out in section 2.13, is concerned with answering the question of 'how is greater food security and sustainability best achieved?' The first area of enquiry was to explore whether convergence can lead to change and that was the main focus of this chapter. It found that convergence, combining production and consumption of place in the form of the fruit and vegetable requirement, provided new insight. The act of creating a population fruit and vegetable requirement shifted the food security onus from the individual to the system level and showed that there were systemic barriers to consumption. However, statistics are not enough in themselves to bring about change – they are useful if they provide people of influence within the system with incentive or information to instigate change.

The fruit and vegetable requirement was convergent in that it brought 'alternative' and 'mainstream' stakeholders together as both were interested in increasing fruit and vegetable production and consumption. Small and large-scale producers could both be encompassed in production scenarios that would fulfil the fruit and vegetable requirement. However, this was not in itself enough to deliver change. There were a range of barriers to production that were beyond the power of producers to overcome and these revolved around divergence in the food system and the need to simultaneously increase consumption. These are discussed in detail in Chapter 5 (Barriers and Enablers).

The act of seeking convergence, in a variety of ways, and using PAR to engage with diverse stakeholders utilised a range of diplomatic skills. The aspects of diplomatic practice that seemed to be facilitatory to the process at this stage were: a clear focus on vision but a flexibility on how to get there, empathy and inclusivity, presenting research clearly, using the art of the possible and power of the positive, being a reflective practitioner and the ability to adapt and change. These are also reflected on and expanded in subsequent chapters.

4.7 Summary

This chapter explored the calculations behind the Wales and UK fruit and vegetable requirement and the results of those calculations as well as the impacts of presenting the research to stakeholders. The research showed that currently fruit and vegetables are produced on only 0.1% of land in Wales and provide an estimated 5%

of the population's fruit and vegetable requirement, and it would take 2% of the land in Wales to grow enough fruit and vegetables for the population to eat '5 a day'; or 2.8% of the land to grow '7 a day'. It also highlighted that there is a fruit and vegetable deficit in the UK overall in that there are not currently enough fruit and vegetables produced or available for the population to meet public health targets of '5 or 7 a day'.

The second half of the chapter looked at how stakeholders reacted to the research and how much fruit and vegetables they thought should be produced in Wales (60% of the requirement). At the time, although producer stakeholders said they found the data to be interesting but not of much use, those trying to influence policy found the 2% of land in Wales to produce '5 a day' a useful statistic. Overall the research on fruit and vegetable requirement provided quantifiable, quotable evidence of public health requirements that could be, and was, used to lobby for increased horticultural production and support for increasing consumption, both in Wales and in the UK. The extent to which it may have contributed towards social change and improving diets, is explored in more detail in Chapter 7 (Discussion).

The requirement was also used to form very broad production scenarios. These provide the crude beginnings of workings which with further engagement from stakeholders could be developed, and form the basis for national policies to support the development of a diverse horticultural sector in Wales and the UK. Schoen and Lang (2016, p.3), after the research phase was completed for this thesis, called for "modelling work to investigate how the UK could meet an increased domestic demand". A more thorough version is needed. A recommendation would be that a comprehensive modelling exercise be undertaken for Wales and the UK. However, although useful information and helpful to illustrate and incentivise, the modelling in itself does not necessarily help to bring about change. Barriers and potential enablers to greater horticultural production were explored with producer stakeholders, large and small-scale, and are detailed in the next chapter.

5 Barriers and Enablers to Fruit and Vegetable Production

5.1 Chapter overview

The fruit and vegetable requirement, knowledge of deficit, and visioning stimulated a wide-ranging discussion of the other barriers and the potential enablers of greater production. Whether the context of a food system approach and the fruit and vegetable requirement and visioning enabled a more comprehensive assessment of barriers and enablers is discussed at the end of the chapter. Schoen and Lang, in their Horticulture briefing paper (2016, p.3), published after the onset of the research for this paper, but before the thesis was written up, called for “an investigation of micro-level decision making amongst diverse UK horticultural producers to understand better what shapes their current market situation” and “a policy review into how the British could both grow and consume more of their own horticultural production”. Increasing consumption was perceived as a key barrier to production by stakeholders, and potential enablers of this are discussed in Chapter 6 (Peas Please) as part of the emergence of the Peas Please initiative.

This chapter explores the barriers and potential enablers to greater horticultural production described by stakeholders during interviews and workshops, as well as during subsequent engagement. This obviously represents the views and opinions of a selection of those involved in and supporting horticulture in Wales in 2015/2016 and is not a definitive list. However, the research reached a point where no new themes were emerging suggesting that sample saturation had been achieved. What was clear was that the barriers and potential enablers, in the main, were shared across the ‘mainstream’ and ‘alternative’ ‘divide’. The barriers and enablers detailed by Welsh producers and support organisations were similar to those raised at a UK level with a slant towards small-scale horticulture issues.

Perceived barriers in summary were the challenge of ‘squaring the circle’ and how to make a living from selling fruit and veg at the same time as producing an affordable product; lack of fairness in the system; training and labour issues; lack of research and development; the constraints of seasonality versus desire for exotic fruit and veg and the culture of fruit and veg consumption; marketing of fruit and veg; and the systemic ‘chicken and egg’ challenge in terms of whether to increase consumption or

production first. Overlying all these barriers is a divergence within the sector and general lack of policy direction and vision which in itself has been a barrier to development.

In the context of having discussed the barriers and yet being positive about the possibilities for the future expansion, the discussions for interviews and workshops led on to potential enablers. The term enabler is adopted here by the researcher to describe positive suggestions for systemic change and was not a term which stakeholders used themselves. The potential enablers outlined in this chapter are based on stakeholder suggestions but are a product of critical reflection by the researcher. They are presented alongside the barriers. They are influenced by the systemic public health approach adopted. In summary, they convey the need for a bold public policy vision, investment in research and innovation, infrastructure and training, the formation of alliances, and increasing consumption and production of fruit and vegetables simultaneously as part of a systemic approach.

5.2 Financial support for the sector (‘squaring the circle’)

> “It is a problem isn’t it? Because actually fruit and veg is really expensive comparative to other unhealthy foods because unhealthy food has got so cheap. So, on the one hand you want to support the industry and on the other there is the whole food poverty problem where you want people to be able to afford to eat fruit and veg, so it needs to be of a certain price. How do we square the circle?” (Small-scale producer)

The above quotation introduces the most frequently mentioned barrier relating to ‘how to square the circle’, that is: how do we get fruit and veg at prices that people are prepared to pay, at the same time as supporting producers to make a living and produce sustainably, when the rest of the food industry is producing unhealthy food at much lower prices and there is competition from cheaper imports? This was a subject of much discussion among stakeholders and this section explores the issue in more detail.

Fruit and vegetable prices are a reflection of the cost of raw materials as well as labour costs, rent prices and subsidies (Food Foundation, 2016c). The perception of most of the stakeholders interviewed, with the exception of one large-scale producer and a few small-scale, was that it is hard to earn a living from selling fruit and vegetables in the UK. Some of the comments from small-scale producers indicative

of this were “I think growing fresh produce is very hard work, very marginal”, “There is not the financial incentive for fruit and veg production” and “We are hanging on by our fingernails. And look at all the thinking and work and expertise and effort that has gone into it: you can’t expect most people to do that.”

In order to survive financially, UK horticulture has generally adopted two approaches: splitting the sector into large-scale production which makes money by economies of scale and supplying volume through supermarkets, and small-scale production which makes money by a variety of direct sales to customers. A large-scale producer, echoing the productionist point of view outlined in the literature review, noted:

> “You have got to drive efficiency, so food gets cheaper and cheaper. What is the value of food? People want to go on their holiday to Disneyland, Florida and they want to spend 25p on a cauli. That’s where it is.”

Many stakeholders noted that supermarkets were selling fruit and vegetables at low prices but large and small-scale producers alike suggested that at those prices there is likely to be some externalisation of costs, environmental, economic or social. This quotation from a small-scale producer highlights that they considered depleted soils and compromised producer livelihoods among the externalised costs of cheap supermarket fruit and vegetables:

> “they are bringing lots of fruit and veg to people, six a week, they might as well just give it to you, 39p for everything or something. It is just an industry soil-destroying thing. You can guarantee that you will remove the organic matter and trash people’s lives, you are bound to at that price, you can’t do the sums and prove anything else otherwise.”

Another stakeholder from a producer support organisation considered poor labour conditions in other countries an externalised cost of cheap produce “We have a market failure and one of the reasons we have such low prices is because of competition from EU products, using slave labour, that is unfair”. An organisation supporting large-scale producers also echoed that producing food cheaply probably involves externalisation of cost in terms of lower environmental standards:

> “If we are producing it to the highest standards it is not always going to be the cheapest. Cheap, safe and reliable, you can’t have all three. We need to explain what we mean by affordable. You can have cheap food if you want to, but it is probably not going to come from Wales or be produced to high environmental or welfare standards or anything else.”

Many producers are internalising the costs of fruit and vegetable production; some driven by a belief that what they are doing is contributing to the greater public good, social and environmental. However, there was general agreement that this was not feasible in the long run and that many were approaching a financial situation where they would not be able to continue, as illustrated by this quotation:

> "We are actually trying to run a community development organisation out of the sales of vegetables which is one of the least profitable industries there is. There is no profit to be had. It is a bit of a non-starter." (Small-scale producer)

The aspects of community development referred to above are common to all the small-scale producers involved in this research, particularly Community Supported Agriculture (CSA) schemes and include supporting volunteers, running community events, engaging people of all ages in healthy eating and growing education and training and promoting fresh produce. In essence what they are attempting to do is facilitate a cultural shift to get people eating healthier and living better lives. There is some evidence that these type of initiatives can improve diets (PHE, 2017).

Many of these businesses, particularly those adopting organic and agroecological production methods, are also providing environmental services such as soil improvement, enhanced biodiversity, carbon sequestration, improved soil quality and reduced flood risk (IPES-Food, 2016).

Another way the fruit and vegetable sector has been maintained is through cheap or free labour. In the case of large-scale producers, migrants work seasonally to help pick and process produce, as for a number of different reasons discussed in the training and labour barrier section there is not sufficient UK labour available for this type of work. Small-scale producers generally work very long hours for very little remuneration and rely on volunteers. The following quotations illustrate the point:

> "We are spending all our volunteer hours subsidizing the vegetable production." (Small-scale producer)

> "…huge amounts of voluntary hours. There are a lot of lessons to be learnt from what we have done. We might just about scrape through. Not many people can or want to work very, very, hard for very little money." (Small-scale producer)

One stakeholder in the early stages of running a fresh produce co-operative shop described, from their website, how they "have a great team of volunteers to staff the shop, enabling us to give a fair price to producers whilst keeping prices low for the consumer". When asked about how the shop was doing the stakeholder replied: "Financially it is not quite there yet (we are not losing money but not making money) but in terms of doing all the other things we want to do, connecting people to food it is doing really well". These stakeholders described how they had based their model on a successful shop in another town that had been running for nearly ten years. At the time of the interview it was outlined that that shop was mainly run by volunteers with a paid manager two days a week. However, according to secondary data, it was clear that over time the shop became unable to support paid staff:

> "There used to be a part-time manager, who was paid a wage to take care of the ordering, staffing and day-to-day running of the shop. Unfortunately because finances are tight (we are losing money) it is no longer affordable to pay a manager for this. Until we are back in a stronger financial position, two of the directors … will manage the shop on a voluntary basis." (Great Oak Foods, 2016)

So even shops run entirely by volunteers, without paid staff can struggle to achieve financial viability selling fresh produce in Wales, although they may be successful in other aspects of sustainability. These particular shops were both trying to source organic local produce and it could be that the costs associated with this type of production just cannot be costed into the price of the product sufficiently at present. This finding is not new. A review of the 'Supply and Distribution strand' of the 'Making Local Food Work Programme' (Jones, 2012) found that, in general, social enterprises working along the same lines in England struggled to balance financial viability with sustainability criteria.

A large-scale producer co-operative selling into the supermarket system reported that they were doing well and expanding sales and production of vegetables. Large-scale producers benefit from land-based subsidies and infrastructure grants which are presently not available to those growing under five hectares in England and Wales, and three hectares in Scotland.

Producers have adopted a range of other methods in order to be financially viable. One large-scale producer suggested they were maintaining profitability by moving from whole to processed vegetables:

> "Once we have picked up all the retailers our tonnage will start to follow the same curve, the pattern of 5% decline year on year. So, we have to try and get these sales back in the prep. market."

The challenge here is how to retain the health benefits associated with increased consumption of fruit and vegetables by not creating products that are high in fat, sugar and salt. For the small-scale, making money through direct sales, driving efficiency and processing are also considered as ways to increase profits. The same issues apply here. If money is the bottom line then is it better to make jam from all the strawberries than sell them fresh? Concentrating on economic returns alone could drive the sector to create unhealthy products from healthy ones. However as long as the health benefits of the produce are being maintained by the processing techniques then this sort of income generation, which also might drive the consumption of fruit and vegetables, could be beneficial.

One way the small-scale sector has managed to survive has been by targeting and supplying richer customers with niche products: "There are various socio-economic divisions that we are not crossing …", but this is a compromise that many are not happy with:

> "We would like to be supplying the lower end of the market but it just isn't economic for us to do that; we have to go for the fancy products and we are more and more looking at those markets, with the idea that we will still try and get good food to ordinary people but we need to find fancy restaurants to buy our stuff because that is where the money is." (Small-scale producer)

Many small-scale producers would like to be supplying people on lower incomes with vegetables but find that they cannot afford to do so, although some CSA schemes have found creative ways to enable lower income consumers to obtain fruit and vegetables. Some take 'Healthy Start' vouchers but they reported that uptake is very low. Others enable lower income customers to swop fruit and veg for volunteering:

> "With the CSA model it is possible that people on low incomes can swop fruit and veg for work or something else, it doesn't have to be money and so it is a model that could help people on low incomes." (Small-scale producer)

Some fruit and vegetable businesses have gone into care farming. Care farms receive funding to provide health, social or educational care services for individuals from one or a range of vulnerable groups (Care Farming UK, 2018). In these types of businesses, fruit and vegetables are co-produced alongside financial support for

providing a social service. This is a potential model for small-scale producers though it was clear that even with the financial incentive, not all producers are interested or have the capacity to do this:

> "What we don't want to become is a care provider, a social thing, but clearly some care farms and organisations do quite well out of that …We don't have time and it is not our passion but how do you tap into money without having to go down that route? It is becoming increasingly hard."

In general then, in order for producers to survive financially in Wales and the UK, fruit and vegetables have to be sold at a certain price:

> "It's a bit like milk being so cheap. You have to draw a line below which you are not prepared to go because if you don't then everything suffers. We should pay more for milk." (Small-scale producer)

Stakeholders were clear that prices could not go any lower as illustrated by the range of the following comments from small-scale producers:

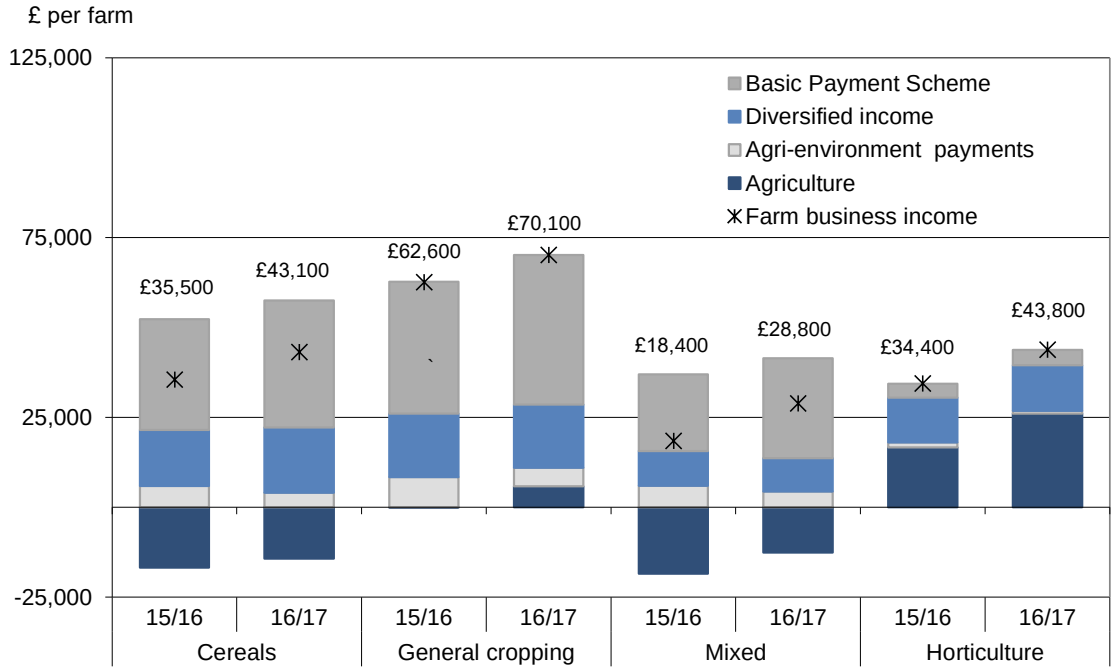
> "If the price went down it wouldn't be viable for us."
>
> "The price needs to go up. People need to be able to spend more."
>
> "It needs to be paid better … but you can't because you can't get that money back out the veg."
>
> "Increases in price are not necessarily a bad thing for growers."

There is then a mismatch between being able to produce high quality and sustainable fruit and vegetables at a price that is inexpensive so that people, particularly those on lower incomes, can afford to buy them to fulfil their health potential. Couple this with increasing availability of cheaper imports, which probably externalise costs of production, and many fruit and vegetable producers struggling financially. The sector is at the stage where there are very few producers able to operate as illustrated by this point from a small-scale producer co-operative stakeholder: "What we consistently fail to do, even though we can sell produce, is to find people with the land, with the machinery". One small-scale producer made the point, in common with the neoliberal discourse, that if UK horticulture cannot be made to pay then it should be allowed to go out of business:

> "When this kind of discussion comes up I am reminded of something I saw in New York state. The woodland is so extensive, a lot of it used to be farm land. Why? because the farmers went out of business. There was no EU/USA equivalent to support those

farmers; that was the market economy: it didn't work so they went out of business. Forget it."

And in general horticulture has been subject to market forces whilst much of the rest of the agricultural system has been buffered, leaving Wales and the UK with a weak horticulture sector. An average horticultural farm in England for instance receives eight times less subsidy than an average more land-extensive cereal producer (see Figure 48):



Source: Farm Business Survey, England

Figure 48. Average Farm Business Income for cropping farms, broken down by cost centres 2015/16 and 2016/17 (Defra, 2017c, p.6).

This is counterintuitive if you assume the food system has a part to play in providing healthy food for public health. Fruit and vegetables are one of the only foods that the government recommends we eat more of and yet the sector producing them receives the least support.

One of the small-scale producer stakeholders questioned whether subsidy for fruit and vegetable production would be justified: "How do we get this investment? Why would you if you cannot get the returns?" They went on: "Even if you cannot make the immediate market price pay, you might be able to in the not so distant future ... that's a pretty big argument to make." The research for this thesis suggests it is an

argument worth considering. Some stakeholders argued that market forces and subsidies have worked against fruit and vegetable consumption and sustainable production and that there is a government imperative to step in to help square the circle. The following two quotations from two different small-scale producer stakeholders help to illustrate the point:

> "If you do the whole argument of inputs and outputs of nutrients and general resources, it all looks very impressive. It only goes wrong as soon as you try and do the numbers on cash; if you have to make it stack up in a market-based model here and now. You can argue that it will get there in the long run, or that any subsidy to make it stack up is worth it for wider benefits; but the immediate market forces of costs versus price achieved are still tricky."

> "If you look at it from just a supply side problem and not a structural problem you might just get the same old, same old: this is a market failure and if you look at it within this frame you say, there is nothing you can do. We are saying that there is public benefit for interfering in the market here."

Examination of Figure 48 shows that actually horticultural holdings make more money from agricultural activity than cereal, general and mixed cropping holdings; the difference being that the others received more subsidy. It may be that farming in the UK is not financially viable in general. It is certainly the case that the sector is currently heavily reliant on financial support. One of the small-scale producers gave an historical perspective, as reported by another farmer in Wales:

> "he said they had been on their land, South of Aberystwyth, for 500 years ... and he was saying that farming has never made any money for long periods of times. They made money in the Corn Law period and the Napoleonic Wars; they made money then and in the World Wars. He made the point that there can be long decades of time when everything is falling to pieces and then there is a period where everybody repairs all the roofs and buildings and they might be living off it for quite a while."

Through EU Common Agricultural Policy farmers have been supported mainly through untargeted means such as land-based subsidies. With the UK's intended withdrawal from the EU and the Common Agricultural Policy there is the possibility that subsidy for agriculture will ultimately be withdrawn completely, leaving it dependent on income generation from agriculture alone; as was, more suddenly, done in New Zealand (AHDB, 2017). However, at least in the transition period, according to the most recent agriculture consultation from Defra, *Health and*

Harmony (2018a), subsidies will remain. But they will change from land-based payments to payments for public goods ("things that benefit more than the recipient and cannot be rewarded by the market alone"[18]).

To date horticulture has shown huge resilience in the face of very little external support and is a highly innovative sector that does not necessarily want subsidy. Despite the challenges reported, fruit and vegetable production is highly productive per unit area (Defra, 2017d). There is a good chance that with investment in the right areas, the horticulture sector, with a resilient and dynamic cohort of producers, and an enthusiastic new wave of entrants, could flourish thus helping to deliver multiple benefits and public goods.

> "Grants and production equipment, helping supply chains – those are the things that get industries going … and training." (Large-scale producer)

A subsidy system orientated around subsidising public goods might consider investing in fruit and vegetable production. Large-scale fruit and vegetable producers, to some extent have benefitted from land-based subsidies and infrastructure grants; though to a lesser extent than producers of other crops:

> "By default, the way the grants work, it is probably only the bigger farms who can access them. They have, one: bigger funds to apply, and two: the plans and projects to go for the £40k grants for capital infrastructure. I know the unions are pushing for smaller grants that are less bureaucratic. But I am finding that because there are less people on the ground and there are all these windows, the farmers have to pay people to do these applications before they are even selected. It is difficult." (Producer support organisation)

For small-scale production this would involve removing the eligibility land cap (five hectares in England and Wales) to capture the range of benefits being provided by small-scale horticultural production. It could be delivered through expanding current schemes or it could be delivered through a bespoke fruit and vegetable scheme benefitting all scales alike. As one small-scale producer commented: "You can argue that the sensible strategic things you can do don't really cost a lot of money." A little investment in the horticulture sector could go a long way, one CSA stakeholder

18 This was the definition used by Defra at a Health and Harmony consultation event hosted by Sustain, in London April 2018, attended by the researcher as part of participatory engagement.

suggested that “with one full time worker we could produce 50% more than we do now”. Three small-scale producers separately noted the importance of infrastructure grants: “Ways that horticulture could be facilitated are: make more land available; ensure venture capital e.g. £200,000 over 5 years to invest in land, tractor, facilities; guaranteed income for 3 years during setup phase” and: “What is really going to make the difference is if you give us £100,000 worth of kit ...” and:

> “Working backwards from that, there would need to be investment in infrastructure, assuming small growers, facilitating collaboration, creating the infrastructure of information: what to grow when (and also the whole sales operation and marketing infrastructure) so the demand is very clearly linked to production and in the physical infrastructure of distribution and storage. I think if Wales invested in that kind of infrastructure, and there was a clear market place, then all the farmers would need to do is do the growing. They also need access to advice and skills, labour and machinery (maybe machinery rings). So all they do is grow stuff. You can’t expect farmers to be business people. (Some are, yes.) Set it all up, get the investment in place, then all you need to do is get the farmers to just grow a field of leeks: easy.” (Small-scale producer)

Horticultural stakeholders in general were unconvinced about the need for subsidy and were concerned about the market distortions it might cause; and yet they were struggling to survive in the relatively less subsidised context and appreciated the need for some sort of support:

> “You have to be careful not to distort the market as well. Just having people planting a field of carrots just to get the subsidy and then them washing around the market as they are not destined for an end customer when they are planted ... I am not a massive fan of subsidies. I am more interested in grants for the equipment needed for the investment needed. That would be more targeted then.” (Large-scale producer)

If we want to avoid the externalisation of cost and reward businesses for generating public goods then some form of intervention in the market might be needed. It could be achieved by some form of ‘True Cost Accounting’ (Fitzpatrick *et al.*, 2017) where those providing public goods are financially rewarded and those detracting penalised; but this is politically sensitive. A positive way of doing this would be through investment in infrastructure for all scales through some sort of fruit and vegetable producer scheme.

Investment schemes to support growers would not necessarily result in a reduction in price, nor would this necessarily be a good idea, so there needs to be some mechanism for helping those people who find it particularly difficult to afford fruit and

vegetables compared to other less healthy foods. This could involve financial assistance to lower income groups to be able to buy fruit and vegetables through some sort of voucher or prescription scheme (Hinks, 2017). One large-scale producer support organisation preferred the concept of prescriptions to vouchers, though vouchers have been used in other countries to support those on lower incomes:

> "Just wanted to alert you that we have an internal conflict when it comes to the use of vouchers. It centres around the price conflict. Giving people vouchers suggests that it is an expensive product that needs subsidizing. Then we have retailers like Aldi and Lidl that are selling fruit and veg at below cost of production at their own cost in order to attract custom. This alters the consumer's price perception and is confusing. We would be more interested in following the prescriptions line: i.e. doctors prescribing fruit and veg. We don't want to feed the perception that fruit and veg is expensive."

In the US, fruit and vegetable 'incentive programmes' are now found extensively. They attempt to 'square the circle' by offering people on lower incomes savings at the point of purchase. Vouchers can be redeemed in a number of venues, including from local fruit and vegetable producers and markets. As well as supporting producers and local food outlets they also incentivise healthy food purchase and aim to reduce the burden of diet related disease. There is some evidence, though based on self-reports, that these type of projects deliver multiple benefits including supporting producers at the same time as increasing consumption of fruit and vegetables by those on low incomes (Hinks, 2017).

There is a voucher scheme in operation in the UK. 'Healthy Start' vouchers are free Governmental vouchers offered weekly to improve the health of low-income pregnant women and families on benefits and tax credits. They are worth £3.10 a week and can be spent on milk, plain fresh and frozen fruit and vegetables, and infant formula milk (Healthy Start, 2018). Women who are at least ten weeks pregnant and families with children under four years old qualify. In practice little is known about how much of the vouchers are spent on fruit and vegetables, although some evidence indicates that the majority of the spend is on milk or infant formula (Lucas *et al.*, 2013). The narrow eligibility criteria, and relatively small amount of money, means that 'Healthy Start' vouchers in their current form are unlikely to provide the levels of support needed to help those on low incomes to eat more fruit and vegetables to any significant extent. There is however a supplementary 'Rose vouchers' for fruit and

vegetables scheme run by the Alexandra Rose Charity and delivered in partnership with Food Matters (Alexandra Rose Charity, 2018). It is being run in London and now some other parts of England. 'Rose vouchers' are worth £3 per child every week and can be claimed if a person is eligible for 'Healthy Start'. There is evidence that the scheme has led to increases in intake of fruit and vegetables (Lloyd, 2014). 'Rose vouchers' can only be redeemed at markets that sell fresh fruit and vegetables, meaning that the project increases consumption of fruit and vegetables and also supports local markets. It does not work in areas without local markets, which limits its potential reach; although it could be extended to include other outlets. Ultimately, the lessons learnt from the best practice of the 'Rose voucher' scheme should influence the development of more effective fruit and vegetable voucher schemes across the UK. The Scottish Government plans to trial an improved 'Healthy Start' voucher scheme under the new title 'Best Start Foods' which will have an increased value and move from paper voucher to smartcard system (Scottish Government, 2018). There is a particular need for a pilot in Wales, and this might require governmental support. These types of targeted, demand incentive schemes could help to support the UK fruit and vegetable sector at the same time as supporting those facing the greatest food security challenges to eat healthier.

5.3 Lack of fairness in the system

> "There is a problem with supermarkets squeezing producers." (Small-scale producer)

This was an issue mentioned by some producers. One of the underlying trends on price is that producers supplying into the supermarket system are getting a lower percentage of the retail price than they did in the past. In 1988 farmers received 47% of the retail value of an average basket of agricultural production staples. By 2015 this had reduced to 40% (Defra, 2016a). This is compounded by what is perceived as some unfair trading:

> "And then there are the business issues where it is very, very, one sided. There are people making a good and stable living working with the supermarkets and there are other people particularly in horticulture who get shafted. I have heard anecdotes directly from growers who say 'we grew 100,000 lettuces, the night before we were going to deliver them the supermarket said thanks but we don't need them', end of story." (Small-scale producer)

Theoretically now there is a mechanism to deal with and try and minimise this type of behaviour. The Groceries Code Adjudicator was introduced in 2013 in order to try and mitigate retailers transferring excessive risk and unexpected costs to their direct suppliers (UK Government, 2013). The Groceries Supply Code of Practice currently applies to retailers with an annual turnover of more than one billion (Tesco, Co-op, Sainsbury's, Marks and Spencer, Asda, Lidl, Morrisons, Aldi, Waitrose and Iceland). Although there is some concern that the Groceries Code Adjudicator does not have the power to effect change there is some evidence that the situation might be improving. One of the stakeholders commented "…everybody who actually trades with them (supermarkets) says that they are ok to trade with as they do pay and they agree a price. There is none of all the dreadful stuff." But producers being squeezed by retailers is likely to continue to be an issue. Total UK household spend on fresh, chilled, frozen, dried and preserved (not juiced) fruit and vegetables, according to the most recent data available on household expenditure, indicates that the 78% of fruit and vegetables are currently bought through supermarkets (£13 billion per year), 17% through other outlets (£2.9 billion per year) and 5% through the internet (£0.8 billion per year) (Office for National Statistics, 2015).

There are proposals for the remit of the Groceries Code Adjudicator to be expanded; for example to cover other trading relationships, so that producers are consistently helped to retain value in the supply chain and be fairly treated. These proposals and any other that strengthen the power of the Groceries Code Adjudicator should be supported.

5.4 Marketing fruit and veg

> "Problem is you have to harvest it, sell it and eat it."
> "People don't have time to grow and market and sell."
> "We struggled for years to access the market."
> (Quotations from three small-scale producers)

Most of the stakeholders, apart from the one large-scale producer co-operative, mentioned that having to market as well as grow produce was a burden and a barrier to growth. The large-scale producer stakeholder potentially provided a replicable example of a co-operative model in Wales that enables growers to get on with the

business of growing, whilst the marketing, selling to supermarkets and other issues are dealt with. This producer support organisation stakeholder comment illustrates the point:

> "They have the route into market, they have packing facilities and staff, agronomists, in house marketing, contractors. They are thinking of investing in machinery, ok it is for large field application … but we could learn something from them."

To some extent, this large-scale co-operative, which is rapidly expanding, has whole head vegetable and root production into Welsh supermarkets covered. That is not to say that there is not the opportunity for other producer co-operatives to deliver other fruit and vegetables, including organic.

Obviously, there are producers who are too small in scale to be supplying into the supermarket system. However, there are examples from other countries, for example France, where small-scale producers effectively collaborate in co-operatives to supply supermarkets, as one small-scale producer noted "We need to learn from France, SAFER, Pierre Rabhi Oasis en Tout Lieu/La Cravirola".

Often at this point there is a discussion of the 'missing middle' in the UK and the need for food hubs, as described by Morley *et al.* (2008, p.2):

> "A mechanism by which small producers can collectively access a middleman facility that enables them to trade with large customers – be they supermarkets, food service vendors or public procurement consortia – that none of them would be able to trade with by acting alone."

This definition presupposes that there is a desire for small-scale producers to trade with 'large customers'. However, it is possible that in this case the desire is more from policy makers than from producers at present. None of the small-scale producer stakeholders interviewed had an interest in supplying supermarkets or bidding for procurement contracts. The margins were considered too low and the risks too high. A stakeholder representing a small-scale producer co-operative commented:

> "Even for the likes of us, who are a relatively organised enterprise, we have looked at several procurement type projects and haven't gone for it. It is just too much."

Another small-scale producer commented:

> "If you are thinking about supermarkets, then you have a whole load of other issues come into it, at the production end there are the varieties they want there is the grading,

> the washing, the preparation, the packing, the storage: that is all a lot of infrastructure and who is going to pay for that?"

Given the low profit margins and the relative lack of support for the sector at present this is understandable. To develop food hubs before the sector has the capacity is possibly a case of putting the horse before the cart, and many of the food hubs that have been developed over the last decade, for example Pembrokeshire Produce Direct (though not exclusively fresh produce), have not endured. This is not to say that, given a more thriving sector, food hubs like producer co-operatives might not become more possible.

The main inclination of the small-scale producers interviewed, however, was that if they were to form co-operatives it would not be to supply into supermarkets or procurement contracts but to create economies of scale to be able to supply more direct markets such as collective box schemes. Three small-scale stakeholders commented:

> "We would have a joint marketing system, share the admin and the transport costs, etc. If we were one of 50 such growers we would have a lot easier time."
>
> "It would be fantastic if they just marketed/bought our produce. We are covering a 10 miles radius and we are still struggling to sell as much as we produce. We are not sold out."
>
> "The more people are doing the easier it would be, you could do so much with the logistics of distribution and processing. You could have infrastructure in place…"

The benefits of pooling produce through working co-operatively include guaranteed markets and marketing, and other options to gain the benefits of scale. One such successful UK example of this model is South Devon Organic Producers supplying into Riverford Organic Farmers box scheme (Riverford, 2018).

The horticultural sector needs to be stronger in order to have a marketing 'middle' even though a 'middle' might make it stronger. This feeds into the 'chicken and egg' situation which horticulture sector is currently stuck in, discussed at the end of the barrier section. The other problem with the 'missing middle' concept is that the middle is not as empty as the phrase implies. There are a number of highly competitive businesses operating in this space, for example Castell Howell and Brakes, particularly supplying into food service and taking up public procurement contracts. They may not at present stock much local produce but this is not to say that given a

more thriving sector and a drive for more sustainable and healthy procurement that they might not in the future. These businesses take on the risks associated with having to provide year round and consistent produce, risks and costs that the small-scale producers interviewed were keen to avoid.

Stakeholders also made the point that as well as specific marketing of produce there needs to be more marketing of fruit and vegetables in order to drive demand in general and in competition with other foods:

> "But it is possible, drinking and driving is becoming less acceptable and smoking is moving in that direction, these were the result of pretty clever marketing campaigns. It is the idea that has to be marketed, as well. To the point where people feel that, of course I am going to buy local potatoes and apples: that is the cool and right thing to do." (Small-scale producer)

The large-scale co-operative stakeholder has shown success at marketing Welsh vegetables in Welsh supermarkets. Even with comparatively (5%) more expensive product they manage to gain supermarket contracts by consistently demonstrating a 20% increase in sales on like-for-like produce when the Welsh Flag is displayed on the bag:

> "We are up against huge Lincolnshire flat fields with depreciated cauli rigs that are still state of the art and have been there for 10 years and 20 Polish workers working in front of them and big efficient factories that can produce a cauli at x amount of price and we are trying to do it down here and buy rigs new and do in smaller fields we are x + 5%. Now if the supermarkets can wear that 5% because it probably comes off their margin because they will retail a Welsh cauli the same as an English one, it's supermarket strategy almost. Some understand that and are prepared to do it because if they will see an overall increase in sales of 20% by stocking a Welsh brand in Welsh supermarket. Then that price loss is irrelevant." (Large-scale producer co-operative)

This large-scale producer co-operative has shown that it is possible to increase sales of vegetables by tapping into cultural values.

Fruit and vegetable producers may need help marketing their produce, not only on a practical scale but also on a national advertising scale. The advertising spend on fruit and vegetables is only 1.2% of all food and drink, excluding alcohol (Food Foundation, 2016c). Given that 40% of the diet by weight, should according to the Eatwell Guide, comprise fruit and vegetables this represents a disproportionately small amount. More needs to be invested in advertising fruit and vegetables. At the

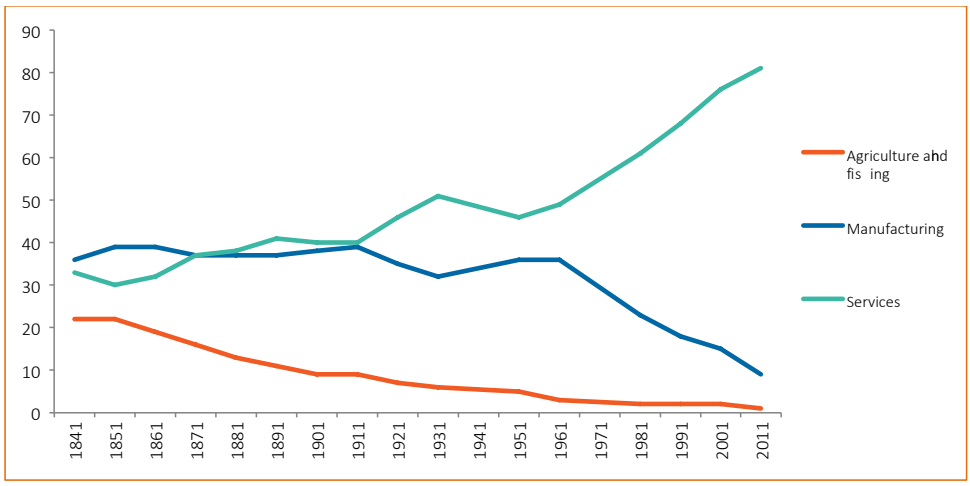
same time consumers need to be supported to eat more and work needs to be done with the retail sector to increase the sales.

5.5 Training and labour issues

Training and the problems of not having enough trained growers was a frequently cited barrier to production. This was mainly a barrier for small-scale producers. On a large scale even with a “lack of skills and knowledge after a generation of specialised livestock production” the co-operative stakeholder, which had expanded production considerably, had a second generation being trained in horticulture on every farm:

> “We are getting highly trained graduates from agricultural colleges. Typically, they come from families of livestock farmers and are coming back home to live and see a future with us. We have good succession, all of our main farms have a second generation who are being trained in new techniques.” (Large-scale producer co-operative)

This quotation highlights that when people can see a positive future in a profession they are more likely to be attracted to it. In this case it was also probably facilitated by the co-operative managing administration and guaranteeing sales thus enabling growers to concentrate on growing. The challenge then becomes how to train up a new generation. For large-scale production at the managerial level this means training in agronomy and technical expertise. At a manual level there is a heavy reliance on migrant labour, particularly from Eastern Europe. Contrary to a general perception these are not unskilled jobs. They are highly skilled in a physical way and can be highly physically demanding, but are often seen as low status with poor conditions and low pay. Large-scale growers have found it difficult to recruit UK workers and if there are to be restrictions on migration following withdrawal from the EU then there might have to be some sort of migrant worker scheme and/or a drive to attract a new generation of UK workers: a difficult task given the long-term trend for reductions in the agricultural and manufacturing workforce and the rise of the service sector (Devlin, 2016).



Source: UK Census data (*4*)

Figure 49. Percentage of working people employed in each UK industry group, 1841 to 2011 (Devlin, 2016, p.13).

Reversing this trend to any degree is likely to be a long-term goal starting with children and teenagers being exposed to the rigours and benefits of outdoor work: "Why isn't growing or local food etc. on the curriculum? ... every school could have a horticultural ambassador" (producer support organisation). There would also need to be further investment in skill development and training courses to provide a career progression within the sector and more general promotion of horticulture as a career.

The problems of attracting and retaining trained growers to small-scale horticulture is also likely to be linked to the perceived lack of financial incentive and negative perception of the sector as a good career choice. This small-scale producer thought that it would take something extreme to change people's perceptions that horticulture was a good career choice:

> "That's still a problem, young people's aspirations. Taken to another extreme if you look at Greece and even Spain, there is a small re-colonisation of deserted villages, projects to start growing, so many young people unemployed, leading to people being prepared to do something that they had previously dismissed; it would probably take something as extreme as that before you would get a massive return to the land."

Other areas of Europe obviously face different challenges, and in the case of Greece and Spain, land prices are likely to be less of a barrier to re-colonisation of rural areas than in the UK. The 'A Matter of Scale' report based on interviews with 69 small-scale producers (Laughton, 2017, p.ii) found that barriers to UK production

were labour issues along with “lack of capital to invest in equipment and infrastructure ... affordability of land and accommodation; and lack of technology suitable for small-scale farmers.”

As one small-scale producer said “It doesn’t matter how much effort goes in to promote the model ... that won’t be enough: there are not actually that many people who want to do it”. Another stakeholder involved in setting up a market garden and box scheme highlighted that “it took six years for us to find a good grower”.

However, some stakeholders were more positive. This producer, who brought in an income of £40,000 per year from fruit and vegetables sales on a small area of land, said the sector needed to effectively and quickly skill up a workforce:

> “We need to strengthen our network, use social media well, train a new generation of growers on placements. Inspiring people that you can make a living from the land.”

There is some evidence that an increasing number of young people are interested in adopting more sustainable livelihoods which involve some trialling a career in fruit and vegetable production. The Soil Association Future Growers apprenticeship scheme is reputed to have had over 1000 applications for limited places. However only 100 people, over the last ten years, have succeeded on going through the training (Soil Association, 2018b). This is a very small number of people given the needs of the sector to develop. One of the issues reported by organisers of Future Growers is not having placements available. It takes a lot of input to support volunteers; especially ones with very little experience of horticulture, and given the constraints already on growers it’s not surprising that many are not keen to take on extra work for an uncertain return. As one producer noted, however; “out of the 1000 or so, only a minority are serious and capable and could make the grade”. Being able to find trainers was also an issue for the ‘Growing the Future’ pilot project, supported by the Welsh Government through ‘EU Rural Development Plan’ funding (National Botanic Garden of Wales, 2018), as mentioned by this stakeholder involved in the project:

> “There were some real inadequacies around lack of trainers in terms of horticulture; not horticulture but food growing. There is a whole set of things around trainers that we haven’t really explored yet. How do we get more trainers for food growing? How do we get them to share their expertise? If they are doing it as a hobby they don’t think they know anything and are not good enough, and we have got so tied up in qualifications

> that they don't think they know anything unless they have a qualification. And people who are growing as a business don't have time. It is a knowledge transfer problem."

Again, this feeds into the 'chicken and egg' situation that the sector is in. The sector isn't big so there aren't the trainers available and there aren't enough people who want to be trained because the sector isn't big or attractive enough. In order to become more attractive the sector needs to overcome the issue of how to square the circle and become a thriving sector. One small-scale producer thought that training is not really the issue:

> "I don't think it is realistic to say we need loads more training. We have Jobs Growth Wales. If you find a person, who is reasonably keen, it is not beyond the realms of possibility that they could come on the pay for 6 months. There is certainly a willingness to spend public money and get young people in work in Wales."

The 'Jobs Growth Wales Apprenticeship scheme' is funded by the Welsh Government with the support of the 'European Social Fund'. It currently pays for apprenticeships for 16–24 year olds at the National Minimum wage rates. However, of 38 food related current apprenticeships and jobs advertised on the 'Jobs Growth Wales' website, part of the 'Careers Wales' website, 30 were in catering and hospitality and none of them were in horticulture (Careers Wales, 2016). There are clearly mechanisms for people to receive training but without a thriving sector generating good incomes and attractive careers, horticulture cannot attract the volume of talent it needs to develop; but without the talent it won't develop to its potential.

One stakeholder bemoaned the closure of plant breeding centres in Wales and the privatisation of ADAS (a provider of research and advice to the agricultural sector):

> "One thing I think went terribly wrong was the closure of a Welsh Plant Breeding Station at Aberystwyth (where the university research station is now, but it is not nearly as wide ranging) because there was a lot of research into arable crops suitable for Wales; and also the closure of the experimental farms and the experimental horticultural stations, which was all done in Margaret Thatcher's time, when ADAS was privatised. Because ADAS used to be a free service for farmers and was very effective. And that is when there was far more innovation, and it was easier for family farms to keep up to date in those days … But if you always have services that always have to be self-funded then it is a bit tunnel vision; they are always going to suggest things that are going to make a profit." (NGO supporting sustainable food)

There needs to be more investment in training. This may not have to be in the form of formal courses. One large-scale grower commented:

> "Whether there is a need to have a big agricultural training structure is questionable. You could have 10 farmers who would provide most of the veg in Wales instead of 1000 farmers, so you now need to train 10 instead of 1000."

Bespoke courses and agronomy would be one need for these type of large-scale fruit and vegetable producers. For small-scale producers peer-to-peer learning was thought to be key, as one stakeholder from a support organisation commented: "Growers gain more from peer-to-peer". Support for peer-to-peer bespoke training is likely to be more effective. There are also many opportunities for small-scale growers to learn from good practice worldwide with collaborations such as 'Farm Hack', a community of collaborators interested in developing and sharing open source tools (Farm Hack, 2018), cited as examples of open source and free knowledge sharing.

Small-scale producer stakeholders and supporters also mentioned the need for training in skills beyond horticulture, such as business skills: "We need to train the next generation of skilled staff in entrepreneurship of micro business and enterprise service delivery".

Training on the job, vocational courses and apprenticeships in fruit and vegetable production were suggested as potential enablers for producers, as well as the development of the image of the sector as a career choice. "It would be good to have some ambassadors and communicators" was a comment by a producer support organisation stakeholder which reflected the need for greater advocacy within the sector. The ornamental horticultural sector has shown some leadership on this with a clear policy vision set out for the sector including a strong training and career promotion and ambassadors strand (Ornamental Horticulture Roundtable, 2015). Developing training opportunities and careers progression is likely to be more effective if it happens in tandem with wider support and development of the sector to make it a more attractive career option.

5.6 Culture of fruit and vegetable consumption

> "Food is different from 'iPads' as Kevin Morgan says, it is a cultural product, it is more emotional, it is linked in with a whole set of values and ideas. You are talking about behaviour change and all the subtleties of that." (Small-scale producer)

As the above quotation indicates, stakeholders, given the context of this research, were preoccupied with issues of how to increase consumption as well as production. There were two main cultural barriers highlighted in relation to getting people to eat more fruit and vegetables in and from the UK. One was that many people eat very little in the first place, there isn't a taste for them, and the other was that the fruit and vegetables eaten are increasingly imported and people have developed a taste for the exotic and out of season.

The reason why people don't eat more fruit and vegetables was much discussed by stakeholders:

> "The biggest problem is cultural. The calories that people eat are not coming from fruit and veg. They don't want the flavours any more. I don't know what the answer is. It has to be around psychological accessibility and values." (Small-scale producer)
>
> "In the local market we get the people who grew up on home-grown food and those people are not middle class but know the flavours and they appreciate our veg. But in the more urban areas that is not the case, it is out of living memory. We have social housing next door and a lot of those people only eat junk food, they don't eat fruit and vegetables at all." (Small-scale producer)
>
> "It is not that those people do not have aspirations for their kids, they just have such a lot else on their plate. They have health and social problems and all these crime problems, it eliminates vegetables off the radar. You can't just tell them you need to eat 5 a day." (Small-scale producer)
>
> "Unless they are making a Sunday roast the evening meal has to be ready in 20 minutes; and that is what the long-term figures show that how long people take to prepare evening meal over the last 50 years has gone down massively." (Large-scale producer)

Lack of convenience compared to other foods, lack of exposure to the taste of fruit and vegetables as children, lack of a culture of fruit and vegetable eating and a range of social issues were mentioned; but price is also a big driver. For fruit and vegetables, the evidence is, though generally based on self-reported consumption, that price makes a difference to consumption. A meta-evaluation of nine studies examining food price changes and diets found that a 10% decrease in the price of fruit and vegetables was associated with a 14% increase in consumption (Afshin *et al.*, 2017). This is reflected in the relative consumption of fruit and vegetables across income levels with those on lower incomes consuming less and those on the highest incomes more (Defra, 2017b). A producer support organisation noted that "if, as we would anticipate, price continues to be the single most important factor influencing

purchasing decisions, then Welsh horticulture cannot, on the face of it, compete with cheaper foreign imports". The question is whether the current situation should be allowed to continue, with the potential outcome of the further diminishment of the UK horticultural sector.

Some thought that cultural shifts were likely to be slow to change, and beyond the scope of educational programmes alone, as illustrated by this comment from a small-scale producer: "Because people's aspirations will have to be changed, and it is difficult to change that quickly, especially with children".

The UK population expect fresh produce all year round and stakeholders generally agreed that consumers would not readily choose to eat only what is in season or what is preserved as illustrated by the following points:

> "I don't think people are going to be happy to just eat preserved and frozen fruits. People love blueberries etc. It's like going back to not having hot water, you don't go backwards with some things civilisationally." (Small-scale producer)
>
> "It is the Guy Watson argument that you open somebody's fridge in winter and even though they are hard line greenies they have cucumbers and tomatoes and red peppers." (Small-scale producer)
>
> "People want a cauli when they want a cauli, they are really unhappy if they can't get it." (Large-scale producer)

All stakeholders agreed that there was a need to continue to import fruit and vegetables, as eating them had become culturally ingrained:

> "So we could certainly aspire to produce lots of fruit and veg but it is a balance/compromise between cultural aspirations, which in Wales have moved along recently. Like the rest of the UK people have been on holiday, they have visited Thai restaurants, they want a fair dose of exoticism, they just about want to eat tomatoes the whole year round, I think we are completely trapped by that and red peppers." (Small-scale producer)

Since people are eating so little fruit and vegetables anyway producers were keen not to push potential fruit and vegetable customers away by only stocking UK produce:

> "We can't grow apricots, bananas, lemons and oranges but it's important to also sell these fruits. We get more customers now that we sell bananas." (Small-scale producer)
>
> "How far can we push to get people away from their desire to have slight exoticism and get them to what is technically possible to grow here? I think you are going to have to accept that obviously bananas, ginger and some things are not going away. It is a bit

> more of a deep-rooted thing. Even oranges we shipped into Cardigan historically came from Spain and are quite a useful dietary import." (Small-scale producer)

People in general then are not eating many fruit and vegetables and this is a problem for producers. The second problem is that the fruit and vegetables that they do eat are increasingly imported. There seems to be then a desire for the exotic and interesting that at the moment is increasingly being fulfilled by overseas produce. That is not to say that the UK horticultural industry couldn't also tap into this desire.

There was a general recognition of the need and potential to extend the season and expand the range of produce grown in the UK as much as possible:

> "I don't see why we couldn't grow most of our own apples. May–July will be difficult, but generally…" (Small-scale producer)
>
> "We could supply a good portion of the fruit, soft fruit etc., for nine months of the year." And "You can grow delicious strawberries, raspberries, blackcurrants and blackberries, loganberries, plums. You can grow a lot of stuff in the summer months. At the moment we are only supplying 5% of our own fruit in the UK." (Small-scale producer)
>
> "Brassicas, all cabbages, white, red, savoy, green, pointed, broccoli, cauliflowers, leeks, swedes, carrots. We did some kale (cavolo nero) this year. We are trialling varieties etc. Which varieties react better to more cloud cover, more UV radiation, higher rainfall varieties react differently. We get different disease challenges, more similar to Ireland than to Lincolnshire." (Large-scale producer)

Producing interesting, different and colourful varieties of fruit and vegetables in the UK to stimulate customers is possible; but the sector needs investment in order for this to happen.

There has generally been a lack of investment in research and development both for large and small-scale horticulture. In terms of large-scale, a supporter of the large-scale sector commented that there were a lot of good ideas from producers on new and different fruit and vegetable products which could be brought to market, but this was being hindered because the cost of doing so had traditionally been borne by the producer:

> "The problem is that the cost of bringing a new product to market is very high and traditionally this has been borne by the producer. There is a big risk in this and it therefore represents a big barrier. What we need is that risk to be taken out by perhaps other parts of the supply chain."

This stakeholder from a producer support organisation suggested that if the costs of product development could be shared in the supply chain, and not just by the

producer, then more innovation would be likely. Innovation on a small scale is also being hampered by lack of investment. There needs to be investment in research and development across the spectrum of scales to increase innovation. This could be investment in production methods and storage and processing. Producers were keen that research was pragmatic and producer-led, with on-farm trials being seen as a potential solution on a large and small-scale.

5.7 Divergence within the sector

There is a divergence in the horticultural sector between large and small-scale producers, organic and non-organic and so on, that means it is a divergent and disparate sector. In an already small sector, this has inhibited co-working and the benefits that come from linking up and strength in numbers. This, along with a divergence between the horticulture sector and the rest of the supply chain, and between the supply chain and public health nutritionists, has meant that the change desired by all these stakeholders, for consumers to buy and eat more fruit and veg, has been more difficult to achieve. Without convergence across these divides, a clear vision and support for it, the horticultural sector in Wales and the UK has little chance of moving away from a ‘chicken and egg’ situation where they cannot produce more because they do not have the support and they do not have the support because they do not produce more, creating a downward spiral of production where increasingly fruit and veg is imported from countries which do support and plan with their horticulture sectors.

There is a need for more co-working across the sector to create a unified voice and add strength. The reason for divergence may be to do with differences of opinion on production techniques and routes to market and aspects of sustainability as well as differing needs of the sectors. A common theme however is a desire for greater production and consumption of fruit and vegetables and this could act as a facilitatory element. There are divergences on at least four levels which could be addressed by four new networks or alliances detailed here.

A fruit and vegetable growers of Wales network would be beneficial. The horticultural sector in Wales is small, as discussed in the literature review; it is comprised of community growers (including community supported agriculture) who are supported

by ‘City Farms’ and now an RDP initiative called Tyfu Fyny, and a myriad of SME growers now supported by an RDP initiative called Tyfu Cymru, and some large-scale growers now also supported by Tyfu Cymru. Now also funded by RDP is a ‘Growing the Future 2’ training for food production at the Botanic Gardens of Wales, and a fruit and vegetable waste reduction initiative run by Glyndwr University as part of the old ‘Horticulture Wales’. So far there has been little joined up working and this has detracted from the potential to develop coherent policy and action for the sector. As part of early participatory engagement for this thesis, a producer stakeholder, in response to hearing about the fruit and vegetable requirement of the population, suggested the development of a ‘Growers of Wales’ group. The researcher went on to facilitate a meeting of growers of all sizes from Wales although ultimately lack of capacity meant that the group did not endure. Tyfu Cymru has agreed to co-ordinate joined up working on horticulture in Wales into the future and this offers hope for a more coherent and stronger voice for the sector in Wales; although the dependence on European funding to assist with these activities is obviously a vulnerability.

A UK Small to Medium Enterprise (SME) fruit and vegetable growers network would also be beneficial. There are presently many organisations and umbrella bodies which support small-scale fruit and vegetable producers alongside other types of producers, for example the Soil Association and the Landworkers’ Alliance. However, there is not one umbrella network for fruit and vegetable producers alone, regardless of production technique. This may have led to a lack of strength in the sector. A group of small-scale producer organisations coming together would represent an opportunity to look at the specific needs and benefits of small-scale fruit and vegetable production and the specific policy asks and actions required to support the sector to develop.

A ‘Fruit and Vegetable Alliance’ of SME and large-scale growers may help the sector to co-ordinate an action plan as to how they are going to increase production in order to increase consumption levels in line with population requirements. These producers could be joined by a broader alliance representing other aspects of the food system, including public health, in order to drive the sorts of systemic changes needed to increase consumption and production of fruit and vegetables.

Through the process of engaging multiple stakeholders in a food system approach to increasing consumption and production it became clear that there was a gap in Wales in terms of an organisation or network looking at sustainable and healthy food, in general, for the population at a systemic level. Scotland has an organisation called Nourish Scotland and England has the Food Foundation, both adopting this kind of approach. Food Cardiff represents an example of an organisation working on a food system approach in Wales but their remit at the time of the initial research for this thesis was Cardiff only. The researcher went on to engage with a number of stakeholders through 'Food Manifesto Wales' with the joint aim of establishing some kind of Wales network or organisation. Ultimately, and in part facilitated by the development of Peas Please as discussed in more detail in Chapter 6 (Peas Please), Food Cardiff went on to form a national organisation called Food Sense Wales which "aims to help apply the knowledge, expertise and experience gained from Food Cardiff and stakeholders across the Welsh food chain to promote food policy and practice that brings benefits to every part of the food system in Wales; our economy, the nation's health and the local and global environment" (Sustainable Food Cities, 2018). Food Manifesto Wales are also continuing to engage more stakeholders in the development of a network to improve the sustainability of the food system.

5.8 Need for vision and planning

Increasing horticultural production cannot just happen overnight. It takes planning and time. Many producers made this point, illustrated by the following quotation:

> "It just takes so long with food. Setting up projects. We have been here 5 years and in some ways it feels like we are kind of on top of a few things that we really haven't been. It just takes so long. Horticultural and agricultural timescales are slow." (Small-scale producer)

An established large-scale producer appeared to say the opposite, that they were ready to fulfil large orders within six months. But this was in the context of years of development, of large-scale investment in infrastructure; some of which had been Welsh Government funded. They also iterated that although they, as a business, had a long term vision they were frustrated that there was not a coherent vision at a governmental level, a vision that would then drive investment and support:

> "There is none of that at a strategic level. It is needed. What do we want to look like in 5–10 years' time, and how do we get there?"
>
> "There is no strategic oversight in where the money should be spent: this is what we want Wales to look like in ten years' time, therefore we need to put money there, there and there."

In general then, the horticultural sector needs vision and long-term planning in order for the appropriate infrastructure and training to be put into place to fulfil demand. For small-scale producers there are barriers to the setting up of infrastructure such as polytunnels, on-site farm shops, and housing for growers. As one grower commented: "We are about to submit a planning application with which we either survive and prosper on the back of succeeding or if we were to fail that could be the end of us". Local Authorities often are not supportive of the need for such structures. If there was a coherent policy which set out the requirement of the population for fruit and vegetables and projected the scenarios for increasing production it would probably recommend an increase in the amount of protected cropping and the number of on-site farm shops. Recommendations could then be passed on to local authorities.

Procurement is another aspect where clearer vision and systemic policy thinking could be helpful. The total public sector food and drink spend is estimated at £74.4m (NPS, 2016). This may sound substantial but compared to Welsh food and drink purchased through the supermarkets, valued by Kantar in 2015 to be £5.2 billion (Kantar, 2016), it is only 1.42% of total spend. A smaller amount of this is spent on fruit and vegetables, in total £7.39m. The National Procurement Service (NPS) estimates that £5.07m is spent on vegetables of which £0.62m (12%) is currently sourced from Welsh producers. For fruit, the spend is £2.32m, £0.31m (13%) of which is Welsh origin (NPS, 2016). In terms of fruit and vegetable food security for the Welsh population, public procurement is a small part of the picture, however it represents a good fixed market for producers and could help facilitate the development of the sector. NPS rhetoric is supportive of local and sustainability and health orientated procurement. At the 2016 Food for the Future Conference, organised by Food and Drink Wales, NPS stated that "food and drink should not be considered as just another commodity to procure by the public sector, as it has great potential to influence health, the environment and the Welsh Economy" (NPS, 2016, p.13). It also added:

> "Shorter supply chains, working more closely with suppliers and sourcing more product direct from source will help develop suitable product ranges for the marketplace, and will remove barriers for suppliers to service the public sector." (NPS, 2016, p.14)

The reality is that many of these procurement contracts, in the face of cutbacks in public services, are being awarded on price rather than provenance, or any other sustainability criteria. The large-scale co-operative producer, who had the capacity to bid for NPS contracts, was frustrated that contracts were awarded to suppliers who do not regularly supply local produce. A comment was made about the lack of systemic thinking on this:

> "Somebody has got to be able to do the maths saying we are spending a heap of money on RDP, which is to support rural business etc., and we are saving 5p a kg on NZ lamb so where is the overall sensible approach. We should be a small enough nation to be nimble on our feet and adapt." (Large-scale producer)

For small-scale producers, as described in a previous section, there is reluctance to take on the risks of the large contacts through NPS contracts. However as the sector develops there may be opportunity to supply into intermediaries, for example Castell Howell and Brakes. This approach was also endorsed in a 2012 Organic fruit and veg sector and public sector procurement report (Menter a Busnes, 2012).

What is clear from engaging with stakeholders is that there has been a lack of vision for the sector and a lack of co-ordinated planning and support at a Welsh and UK Governmental level that may have hampered the sector's ability to thrive and develop.

Although the Welsh Government funded a programme through RDP funding called 'Horticulture Wales', this failed to create that clear vision for the sector; rather it concentrated on how to support the sector to become more efficient by providing focussed support and advice (Horticulture Wales, 2018). Instead of funded programmes like this it may have been better to develop a coherent plan for the sector linked to the health requirement of the population with committed infrastructure funding and training alongside development of facilitative procurement and planning permission. This would give a confidence to the entire sector to invest in the future. A newly RDP funded programme on Horticulture in Wales called 'Tyfu Cymru' has

aspirations to create a Wales horticulture action plan, although the breadth of this is yet to be revealed.

Chapter 4 (Requirement) looked at scenarios, based on the fruit and vegetable requirement of the population, for fruit and vegetable production in Wales and the UK. With development these have the potential to form the basis for coherent joined up governmental policy and action plan for the fruit and vegetable sector. Action for the sector could involve support for infrastructure, innovation, facilitative planning, procurement commitments, training and apprenticeships, marketing, demand incentives such as voucher schemes, and support for collaboration.

5.9 The systemic challenge; transcending the 'chicken and egg' situation

> "It is all very well but increasing production is no good at all without having a market for the produce." (Producer support organisation)
>
> "This question very much linked to improving demand." (Producer support organisation)

Not having a market for produce was continuously brought up as a key barrier to expansion. That the horticultural industry in Wales, and to certain extents the UK, is stuck in a 'chicken and egg' situation was mentioned independently by three different stakeholders and alluded to by a number of others:

> "Then you have a real chicken and egg situation as there is no real infrastructure that could come close delivering. There is just not the capacity to produce, so I think you have to invest in the production side first." (Small-scale producer)

The dilemma discussed by stakeholders was whether to increase production or consumption first. In general, producers thought that consumption has to increase first in order to drive production; as illustrated by the following comment by a producer support organisation stakeholder: "Without increasing demand farmers can't produce more".

Consumption of fruit and veg isn't high enough and there's a reliance on imports so there isn't a strong horticultural sector. There isn't a strong horticulture sector so it lacks the capacity to drive increases in consumption and production, leading to a further degradation of the horticultural sector. There is a need to break the cycle of erosion which, as discussed in Chapter 2 (Literature Review), is not a matter of the

physical capacity to grow fruit and vegetables in Wales. One producer support organisation stakeholder commented:

> "Anglesey was probably the biggest producer in Wales, certainly in terms of variety, though Pembrokeshire has always had a stronghold."

There are other factors, as discussed in the literature review, apart from absolute growing conditions that have worked to disincentivise production over time. Analysis of the research suggests that the current low level of production and a perception that growing fruit and veg is not 'Welsh' or a thing that is done in Wales, is a barrier to production in itself. Here are some comments from a producer support organisation:

> "Has horticulture got the same affinity with Wales as lamb or beef? Let's be honest we are good at growing grass in Wales and so we are looking at red meat and milk production and potentially poultry. I don't think many farmers have thought about fruit and veg production. It is not a sector which is familiar."

This has meant that fruit and vegetable production has not had the advocacy it needs to expand from the traditional support membership organisations:

> "It is difficult because we have such a base of red meat producers and naturally it has come that they have a levy board and a marketing promotion body and naturally that comes as more get involved in it. That builds over time. Because it is quite new and you are looking at such a concentrated number of producers in Wales at the moment probably not quite there; chicken and egg: what comes first?" (Producer Support Organisation)

This was echoed at a UK level. This stakeholder from a national producer support organisation also showed the slightly negative attitude to UK production:

> "We can't grow it all in the UK. Seasonality means that we can't always produce what we need. There are suppliers in other countries e.g. processors in the potato industry in Belgium who have such efficient systems that it would require a huge amount of investment for the UK to compete. That is why we have never set a target for self-sufficiency."

This comment does suggest however that with the right investment increased production is possible. The Netherlands and Ireland, both with climate and land similar to the UK, have strong horticultural sectors. These also have strong government support and leadership and action plans for their fruit and vegetable sectors. With a positive attitude and policy, fruit and vegetable production can be

facilitated and there is certainly appetite in Wales. A Wales stakeholder from a support organisation commented:

> "Our view is strongly that we are a food producing nation and that there are fantastic opportunities out there for us to capitalize on growing with domestic and global populations and we think we are well placed to produce more food in Wales at the same time we have to minimize our impact on the environment and for every unit of production we reduce our impact on climate change as well. But we very much have a growth agenda for food. It is looking at what opportunities are out there. It could be fruit and vegetables. We are looking at producing more food and adding value wherever we can."

So, to some extents there is a 'chicken and egg' situation. Not much fruit and vegetables are grown in Wales or the UK so not much support is given to support the development of fruit and vegetable production. This potentially leads to a downwards spiral of production. Some producers, large and small-scale, have defied this trend and have shown that there is capacity to increase production:

> "You get farmers sometimes who say 'you'll never grow more than 1000 tonnes of potatoes in Pembs' and now we are growing 3000 and we are still being offered loads of land. So I think the Vale of Glamorgan, Pembrokeshire, and down to Wye and Usk Valleys where most of our potatoes come from already- there is still huge potential to grow what we want really." (Large-scale producer)

This 'chicken and egg' situation has been noted by other researchers for example Schoen and Lang (2016, p.3): "What will it take for consumers, food chains and government to unlock the current lock-in of deficient supply and consumption?". How to move beyond this 'chicken and egg' situation was a key question for the Participatory Action Research for this thesis. There was a general perception that the ability to drive increases in consumption lay, to some extents, outside of Wales, as most of the head offices for retailers and food service providers were outside of Wales. This perceived lack of ability to effect change within Wales, because the power to do so lay outside, was a barrier to change in itself in that it provided an excuse for inaction. Reflection on this point led to the researcher to look beyond Wales for answers as to how to increase consumption and production.

The problem might revolve around conceptualising the different parts of the system as separate. Just as the question of whether the chicken or egg comes first makes little sense at the level of the organism, as they are just different parts of the lifecycle of one creature, so too whether to increase food production or consumption first

makes little sense at the level of the food system. If we look at the problem at a systemic level, we can see there is a need to tackle both production and consumption issues at the same time. This then starts to enable the sorts of changes that are simultaneously needed to increase production and consumption.

This thesis began by proposing that there is a problem with trying to drive food system change by concentrating on one aspect of the food system alone: historically, consumers. It then went on to suggest that there was a need to link production and consumption and this was done through the use of the fruit and vegetable requirement. Having engaged with fruit and vegetable producers and other stakeholders on the fruit and vegetable requirement it became clear that there was a need to increase consumption, but the focus on production and consumption alone was not enough to facilitate change:

> "We need more people working on it. It is quite frankly difficult enough to do the growing without having to change the culture too." (Small-scale producer)
>
> "What was shown was the investment that is required. To make that investment you have to have some guarantees of market at the end of it. It is about integrated supply chain, you need the market ready before you can invest in production." (Small-scale producer)

Following critical reflection as part of PAR, it became clear that there was a need to engage with other aspects of the food system such as retailers and food service providers, in order to attempt to break the cycle of excuses inhibiting action. These comments, not from stakeholders interviewed but from participatory engagement, help to illustrate the point:

> "We can't eat more fruit and veg because there isn't enough in the shops." (Consumer) "We can't grow more because people don't eat it." (Producer) "We can't sell more because there aren't the growers." (Retailer/ Food service Provider)

One way to move beyond this lock in is to highlight that responsibility lies with everybody involved in the system doing something simultaneously to effect change. This led the researcher to engage in discussions with other stakeholders, beyond Wales, who were also interested in driving fruit and vegetable consumption through food system change. Engagement with Nourish Scotland and the Food Foundation helped with the development of 'Peas Please', an initiative to drive up vegetable consumption through food system change. The next chapter explores this in detail.

5.10 Reflection on research questions

This thesis, as discussed in section 2.13, is concerned with answering the question of ‘how is greater food security and sustainability best achieved?’ The second area of enquiry was to explore the barriers and enablers to greater fruit and vegetable production and consumption and that was the main focus of this chapter.

The convergent approach of combining production and consumption led to producer stakeholders discussing a wide range of barriers and enablers to fruit and vegetable production that went beyond barriers to production alone. These were the challenge of ‘squaring the circle’ and how to make a living from selling fruit and veg at the same time as producing an affordable product; lack of fairness in the system; training and labour issues; lack of research and development; the constraints of seasonality versus desire for exotic fruit and veg and the culture of fruit and veg consumption; marketing of fruit and veg; and the systemic ‘chicken and egg’ challenge in terms of whether to increase consumption or production first.

It highlighted that although there are some differences in the barriers faced by small and large-scale producers, there is much cross-over and that the divergence within the sector and general lack of policy direction and vision may in itself be a barrier to development. The enablers suggested were a bold public policy vision, investment in research and innovation, infrastructure and training and the formation of alliances. Also highlighted was a need to increase consumption and production of fruit and vegetables simultaneously. Without a convergent approach these sorts of insights may not have emerged. The exploration of barriers and enablers, although insightful, was not in itself enough to facilitate change.

Practices, in the realms of personal diplomacy, that may have been facilitatory to change at this stage, were a clear focus on vision but a flexibility on how to get there, empathy and inclusivity, humility, persistence and being a reflective practitioner.

5.11 Summary

Talking about increasing production with growers led to discussions of barriers and possible enablers; these differed slightly between large and small-scale producers, as detailed in this section, but one of the main findings of this research is that there is

much crossover. The divergence in the horticultural sector between large and small-scale producers, organic and non-organic, means that at present it is fragmented and divergent. In an already small sector this has inhibited co-working and the benefits that come from linking up and strength in numbers. This along with a divergence between the horticulture sector and the rest of the supply chain, and between the supply chain and public health nutritionists, has meant that the change desired by all these stakeholders, for consumers to buy and eat more fruit and vegetables, has been more difficult to achieve. Without convergence across these divides and a clear vision and support for it, the horticultural sector in Wales and the UK has little chance of moving away from a 'chicken and egg' situation where they cannot produce more because they do not have the support and they do not have the support because they do not produce more. Thus creating a downward spiral of production where increasingly fruit and veg is imported from countries which do support and plan with their horticulture sectors. The finding of this thesis is that an integrated approach may be needed, linking all aspects of the food system, public policy, public health, training, marketing, research, production and consumption. A further recommendation would be that this is backed up with investment in innovation, infrastructure, training and apprenticeships, collaboration, demand incentives and marketing.

6 Peas Please

6.1 Chapter overview

Because the Participatory Action Research (PAR) for this thesis explored how to achieve food system change for better nutrition, this chapter details the participatory engagement of the researcher in the development of Peas Please, a national initiative to increase vegetable consumption[19]. The researcher was not observing this initiative from the outside but actively participating, along the lines of PAR and particularly Solidarity Action Research, as outlined in Chapter 3 (Methodology).

This chapter reflects the researcher's engagement in Peas Please and not the history of the development of the initiative from a more objective outside perspective. There were many people involved in developing Peas Please, and every stakeholder would have a different perspective on its development. In this chapter the researcher figures disproportionately in the narrative to justify the critical reflections on approach and practice in the discussion and conclusion. These are based, alongside consideration of what others were doing to try and drive change, on critical reflections on the researcher's engagement. The advantages and disadvantages of PAR are reflected upon in Chapter 7 (Discussion).

This chapter begins with a recap of the thesis to date and goes on to outline how the research fed in to the development of Peas Please in Wales. It then goes on to detail the outcomes of the initiative and to illustrate how the Peas Please food system approach has potentially managed to transcend the 'chicken and egg' situation outlined in the barriers section and offers the potential to increase consumption and production of vegetables (though not fruit). This chapter is a descriptive results chapter and, alongside the other results chapters, forms the basis for Chapter 7 (Discussion) and Chapter 8 (Conclusion). Chapter 7 (Discussion) looks at the emergent themes in detail, including convergence, a food systems approach and the potential and limitations of the Peas Please approach. In a number of places this chapter points to potentially important aspects of the practices adopted and these are integrated with other learning points from the research for this thesis into Chapter 8

19 Details of Peas Please can be found at https://foodfoundation.org.uk/peasplease/

(Conclusion) which reflects on practice and what it might take to achieve positive systemic change.

Chapter 2 (Literature Review) outlined some of the problems of the food system and suggested that solutions might lie around combining production and consumption and greater convergence between actors within the system, reflecting a more systemic approach. Fruit and vegetable consumption and Wales was used as a starting point, and consumption and production were combined in terms of the calculation of the population fruit and vegetable requirement for Wales. The fruit and vegetable requirement was used to engage stakeholders, through PAR, in how to increase consumption and potentially production of fruit and vegetables in Wales and the UK. Engagement with a range of stakeholders including policy makers led to take-up of information with the '2%' (of land needed to produce '5 a day' in Wales) being widely quoted and the knowledge of a production and consumption deficit noted at a Welsh Assembly and Government level. It also led to an exploration of barriers and potential enablers to greater production and consumption and scenario building.

However, as part of the iterative cycle of research, action and critical reflection, integral to the chosen PAR methodology, it became apparent that linking production and consumption through the requirement in Wales was by itself not enough to facilitate change. There were a number of barriers which could not be overcome without moving beyond the initial research approach. The main barrier was that without engaging with the rest of the supply chain, for instance retailers and food service providers, there was not a link to influence increases in consumption. Just as the narrow focus on consumers for the '5 a day' campaign was criticised in the literature review as being insufficient to drive systemic change, so too could the equally narrow focus on production and consumption in the first few chapters of this thesis be subject to similar criticism.

Ten of the eleven different strands of participatory engagement, outlined in Chapter 3 (Methodology), involved working within Wales: The Food Values Event, Wales Food Manifesto, Food Network Wales, Growers of Wales, Calon Cymru, Tyfu Cymru, 'City Farms' (Tyfu Fynu), the Community Land Advisory Service, Welsh Assembly Cross-Party Group on Food, National Assembly for Wales Climate Change, Environment

and Rural Affairs Inquiries, and Food Cardiff/Food Sense Wales. This gave the researcher a good understanding of what was likely to be achievable within Wales. It appeared possible to try and influence agricultural policy, agriculture being devolved to the Welsh Government; but trying to influence the food system more generally seemed more problematic. Many stakeholders claimed this was limited due to a lack of head offices of national businesses in Wales, such as supermarkets and food service providers, which are the main influencers of the food system in Wales. This barrier was highlighted a number of times and is a reflection of the consolidation and globalisation of the food system as discussed in the literature review. This links to the limitations of scale and place in addition to the benefits discussed in Chapter 7 (Discussion). Since much of the decision making for the food system lay outside of Wales, in order to drive change there seemed to be a need to engage at a UK level. To begin with, this seemed beyond the scope of the research for this thesis, though through networking it became possible.

Another barrier was that the research for this thesis was presenting an approach which was somewhat new at the time in Wales. Three separate stakeholders working at a policy level noted this. Two of their comments are illustrated below and another in the subsequent paragraph:

> "I think you are doing a piece of work in what is a void generally. Sometimes you get an immensely obvious area that is just unaddressed and this is one of them." (Ex-Assembly Minister)
>
> "Nobody else is looking at it that way." (Food governance/public health/statutory stakeholder)

Although the research helped increase the number of stakeholders in Wales engaged with a food system approach to increasing fruit and vegetable consumption, and this helped later with Peas Please, to some extent the researcher was an isolated voice. As one policy official commented, "are you still ploughing your lone furrow?" There was not an organisation or network in Wales at the time adopting this type of approach, nor an overall umbrella for sustainable food *for* the whole nation. This meant that this type of work lacked the driving force in Wales. This led the researcher, as part of the participatory engagement phase of the research, to explore potential collaborations. One avenue pursued to try to establish a sustainable food network or organisation with other stakeholders from 'Food Manifesto Wales'. These

stakeholders shared the view that there was a need for some kind of organisation or network in Wales to drive forward this type of work.

In Scotland there was Nourish Scotland looking at sustainable food for the Scottish nation (Nourish Scotland, 2018) and Manifesto stakeholders organised to meet with one of their staff members at the Oxford Real Farming Conference in January 2016 to see what could be learnt from their experience. This was used by Manifesto stakeholders to help inform further developments of a new network. For the researcher, this conference introduced a potential group of UK collaborators who shared a common perspective that there was a need for systemic change to address fruit and vegetable consumption: Nourish Scotland and the Food Foundation. The recently established Food Foundation, based in London, ran a workshop asking what the 'alternative' food system could do to increase fruit and vegetable consumption. Given that this was complementary to the research for this thesis the researcher attended and met the Food Foundation team (of three) for the first time and was subsequently invited to the launch of their report 'Force Fed: Does the food system constrict healthy choices for typical British Families?' (Food Foundation, 2016b). Following the launch and given the complementarity of approaches and geographical spread across three countries of the UK, a conference call was organised between the Food Foundation, Nourish Scotland, the researcher and another Manifesto stakeholder. This resulted in the researcher, the Food Foundation and Nourish Scotland agreeing to move forward together with systemic work to try and increase vegetable consumption at a UK level. The decision to concentrate on vegetables alone was based on a desire to focus efforts on one area. Although fruit purchasing had seen increases in recent years vegetable consumption had not. At the same time the UK has great potential to produce vegetables and contributes a far higher percentage to overall supply than fruit. Deciding to concentrate on vegetables alone was tactical given limited resources, and about choosing your battles carefully, a key aspect of practice that will be revisited in Chapter 8 (Conclusion).

The first step in this process, in order to address broader aspects of sustainability and develop the credibility of the initiative, was to invite a national health or environmental organisation to be one of the core partners. World Wildlife Fund UK (WWF-UK) agreed to join the new steering committee which ultimately became

known as the project board. This was the beginning of what became known as Peas Please[20].

As an activist researcher with a commitment to social transformation, the iterative cycle of PAR highlighted that more needed to be done to deliver positive social change in the food system and so the researcher proceeded with this line of participatory engagement. This persistence and willingness to adapt and change was a common characteristic of the work of the project board and forms part of a set of practices outlined in Chapter 8 (Conclusion). The challenges of actively engaging in project development at the same time as completing a PhD were great and are discussed, with recommendations for practice, in more detail in Chapter 7 (Discussion).

6.2 Peas Please

The Food Foundation established themselves as the convening organisation by drafting a detailed concept note titled 'Eating more veg! Addressing the supply side barriers to vegetable consumption in the UK' (Food Foundation, 2016a). The objective outlined was:

> "To secure commitments, embedded within an accountability framework, from industry and government to improve the availability, acceptability (including convenience), affordability, and quality of the vegetable offer in shops, schools, fast food restaurants and beyond, and in turn stimulate increased vegetable consumption among the UK public, particularly children and those on a low income." (Food Foundation, 2016a, p.1)

This became the basis for action for the initiative and described the following five phases:

Phase 1	Scoping and building support (Feb-May 2016).
Phase 2	Underpinning research and agreeing governance arrangements (April–June 2016): 1. Research: production of veg fact file 2. Establishing governance arrangements.

20 The Peas Please website can be found at https://foodfoundation.org.uk/peasplease/

Phase 3	Generating ideas, surfacing innovation, solving problems (June–December 2016): 1. Vegetable Retreat where veg fact file is presented and key supply side barriers agreed upon and solutions identified 2. Workshops led by stakeholders from the Retreat and other experts to suggest recommendations for action 3. Wider consultation on recommendations • Build parliamentary support across the UK • Build strong links with government initiatives in all devolved nations • Building wider support for the initiative by launching veg fact file • Consolidation of the recommendations captured in some kind of compact which will form the basis of the work in Phase 4.
Phase 4	Summit planning and delivery (January–June 2017): Taking recommendations from phase 3 and using them to lobby the major actors in the food chain and to come to Summits with commitments in line with the recommendations.
Phase 5	Accountability and follow-up (June 2017 onwards): Consolidating the commitments made and implementing the accountability mechanism agreed in Phase 3.

Figure 50. Chronological plan for Peas Please development adapted from the Food Foundation concept note titled ‘Eating more veg! Addressing the supply side barriers to vegetable consumption in the UK’ (Food Foundation, 2016a).

The phases were designed in the hope of developing a common vision, credibility of the initiative, engagement and buy-in from food system stakeholders. How these phases played out in terms of activities and outcomes, particularly those in Wales, are described in the rest of the chapter. The researcher, as a member of the project board, was involved with developing the initiative and seeing it through the above phases. Activities went beyond the role of a researcher, though these skills were utilised, and into the realm of project development. This marked the juncture from PAR where the researcher was working more or less as an individual to a more collective and collaborative PAR better described as Solidarity Action Research, as outlined in Chapter 3 (Methodology).

The Food Foundation emphasised that it was important for them to be reaching out across the UK, and that although being based in London had its obvious advantages in terms of links to head offices and Westminster, it did not easily facilitate work in other parts of the UK. They were deliberately seeking stakeholders with relevant

networks in the devolved nations and hence the collaboration with the researcher in Wales and Nourish Scotland. If there had been an obvious Wales wide food organisation at the time then it is likely that they would have been approached but this was not the case and the researcher filled the gap. From the beginning it was hoped that there would also be a representative from Northern Ireland on the project board but there was not an obvious lead and it took another two years before more tangible links were able to be made. During phase one, in parallel with discussions in Scotland and England, the researcher used existing networks to contact many stakeholders in Wales outlining plans for a UK-wide initiative. These discussions later proved useful for attracting and maintaining support.

As part of phase two, a number of the project board members, including the researcher, were tasked with researching baseline information for inclusion in a vegetable fact file. The purpose of this document was to lay down the rationale for the project and to establish, in one place, the evidence base on production and consumption and supply chain needed to inform the development of an initiative which aimed to tackle supply side barriers to vegetable consumption. Drafting the vegetable fact file helped the board members to understand and tease out issues of significance, and was thus a useful process. The original vegetable fact file included a section on sustainable growing methods and called for a reduction in pesticide use. This proved controversial and nearly caused a walk-out by a handful of stakeholders when the draft was shared at the Vegetable Retreat in Birmingham, as discussed in more detail in the Vegetable Retreat section.

During the drafting of the vegetable fact file there was discussion as to what the initiative could be called. After much deliberation and input from logo designers, the project board decided on Peas Please: Making a pledge for more veg:

Figure 51. Peas Please logo.

This logo came to be widely recognised with large retailing and manufacturing companies requesting to use it on products, though this was not actioned by the project board due to Peas Please not primarily being a consumer facing initiative.

The five P's, initially suggested by Nourish Scotland and summarised here by the researcher, helped explain what the initiative aimed to achieve:

1. Producers – more people growing veg sustainably at all different scales.
2. Prices – fair prices and fair treatment for producers and affordable prices for consumers.
3. Products – new ways of getting veg into what we buy and eat every day.
4. Placement – more prominence in shops and on menus, and more places to buy it in towns and cities, so it has chance to compete with convenience foods.
5. Pleasure – making our veg delicious whenever we eat it.

As the initiative developed 'Places' was added to the list of 'P's to reflect the role of cities in bringing all aspects of the initiative aims together to drive change at a regional level. Cardiff played a significant role in this and this is discussed in more detail in this chapter.

6.3 Vegetable Retreat

The Food Foundation took on the main role of organising and funding a retreat in Birmingham for 23 'experts' (a term used in the original concept note (Food Foundation, 2016a)). The 'experts' working in the vegetable food system were selected by the project board. The main role of the researcher, as well as contributing to the vegetable fact file, was to help ensure representation from Wales and help with facilitation of the workshops. Three key stakeholders from Wales were invited, one

from the Welsh Government, another from a large-scale producer co-operative, and one from Food Cardiff. These were all stakeholders who had been involved in and were supportive of the research for this thesis. Food Cardiff had hosted a workshop on the fruit and vegetable requirement of Cardiff and how much of the requirement should be produced in Cardiff and Wales. This had led to a commitment to action around increasing fruit and vegetables production and consumption in Cardiff, though in practice, because of a lack of links to stakeholders in the supply chain at that point, this had proved difficult to action. Attending the Vegetable Retreat was the next step in progressing this work and the Food Cardiff representative became the only other Welsh representative at the Retreat.

At the Retreat, and in addition to Food Cardiff and the project board, there was a broad representation of stakeholders from across the supply chain and spanning the 'alternative' and 'mainstream' spectrum[21]. The diversity of stakeholders coming together was noted as being unusual as well as that this had been facilitated by the public health platform offered by the initiative and networking of the Food Foundation.

The idea was to build a common vision and key collaborators by engaging a group of food system stakeholders in an immersive day of looking at the food environment in a real-life setting (Birmingham) and then in generating a shared vision for the project. All but eight of the original stakeholders went on to be involved with Peas Please in a substantive way indicating that this approach was to some extent successful. For the researcher, and for Food Cardiff, it was an opportunity to engage with stakeholders in the broader fruit and vegetable supply chain which not been easy to achieve from within Wales.

The immersive day one, where stakeholders visited a range of venues around Birmingham where vegetables were being produced, wholesaled, retailed and cooked, helped build relationships and cross food system discussion on the barriers faced by the proposed initiative. Translating this wide ranging and open discussion

21 National Farmers Union (NFU), Agriculture Horticulture Development Board (AHDB), Sustainable Restaurant Association, Brassica Growers Association, Waste and Resources Action Programme (WRAP), Linking Environment And Farming (LEAF), The Jamie Oliver Foundation, Tesco, LEON restaurants, Sodexo, Eat Balanced (healthy pizza company from Scotland), William Jackson Food Group, Mash Direct (potato and vegetable producer and manufacturer from Ireland), Reynolds (fruit and vegetable supplier), Asplins (fruit producing, packing and marketing co-operative), DEFRA, a public health nutritionist from Birmingham, Birmingham City Council, a public health consultant, The London Produce Show, Changing Markets (NGO to drive change for a sustainable economy) and a food writer and broadcaster.

into proposals for action, on day two, proved more difficult as underlying divergences and power imbalances began to surface.

Day two began with a presentation of the draft fact file which had a substantial section on the need for more sustainable production methods. Although there was general agreement about the health aspects there was tension when the ‘sustainable production methods’ section of the fact file was presented. It became apparent that the vegetable fact file, as a founding document of the initiative, could not be endorsed by a number of stakeholders in the room because they could not agree with the section which stipulated details about sustainable production methods. This was not trivial and it needed to be addressed in order to keep the stakeholders involved in Peas Please. A number of the stakeholders were drifting away from the initiative and were about to walk out. Meanwhile, instead of addressing this issue at that point, the workshop went on to explore barriers to consumption. The project board, being alert to mounting tensions, realised the problem and organised an emergency lunchtime meeting on the fact file for stakeholders who had issues with it. Over lunch a number of stakeholders, mainly those representing large-scale producers, went through the fact file line by line and removed most of the sustainable production section, though evidence of the degradation of the nutrient content of vegetables over time stayed in.

The decision to take out the sections on sustainable production methods created a platform which all stakeholders could then stand on and the situation of a division was avoided. This illustrated how public health potentially offers a more neutral platform compared to one based on food production methods. It was agreed that sustainable production methods be addressed in other ways. For some this is a criticism of the approach and this is elaborated on in the discussion.

Although a walk-out was avoided, there were still tensions for the rest of the day. On reflection, tensions were in part due to a last minute change to the proposed facilitation of the day, which changed it from being fairly tightly facilitated to a more open democratic approach, as often used by NGOs. This approach did not go down well with some of the business stakeholders and this was a learning point. As the day proceeded tensions started to rise and certain stakeholders showed their discontent by starting to dominate. A tension between those who considered the status quo to

be largely satisfactory but in need of ‘tweaking’, and those who considered the status quo to be untenable, essentially the tensions between the ‘mainstream’ and ‘alternative’ paradigms, came to the fore. In terms of the vegetable requirement and production targets, stakeholders questioned how the figures had been calculated and how much of the requirement should be grown in the UK. There was also a reluctance to set a target for home production. The visioning session on a possible ‘better vegetable future’ was considered by some stakeholders to be naïve. They were perhaps more motivated by pragmatism as to what is possible to achieve within the current system. It was unclear by the end of the day how the project could move forward.

At the Retreat, Food Cardiff was introduced to Nourish Scotland and the Food Foundation for the first time and received an immersion into what the project was trying to achieve, as did the rest of the stakeholders. This relationship development and networking was positive and although the Retreat’s outcomes were not clear at the time, subsequent work based on a clear vision for the initiative, by Nourish Scotland and the Food Foundation, helped to rescue the situation and inform practical next steps.

6.4 Veg Facts and Peas Please Launch 7 November 2017

Following the in-depth feedback from stakeholders at the Retreat, the vegetable fact file which became known as Veg Facts (Food Foundation, 2016c) was adapted and prepared for publication. The Food Foundation, along with research skills, brought communication expertise which helped create a document that was both well researched and accessible. It covered:

> “How much veg do we and should we eat? How do we eat it? Are we eating more or less than in the past? Why should we eat more veg? Is our veg becoming less nutritious? Is veg unaffordable for some? Is it easy to eat veg if you want to? Do we want to eat veg and are we producing enough?” (Food Foundation, 2016c, p.2-13)

The researcher helped research and write Veg Facts and information on vegetable requirements; this was adapted by the Food Foundation, and was integrated as outlined in Chapter 4 (Requirement). The researcher was responsible for adding Wales-specific references such as “in Wales, since the campaign began,

consumption has fallen from 39% of people eating five a day to 32% ...” (Food Foundation, 2016c, p.4).

It was then the task of the project board to organise the launch of the report and the initiative in the three nations represented. The Food Foundation took on the responsibility for running a London based launch at Borough Market, Nourish Scotland a launch in Edinburgh, and the responsibility for a Wales launch in Cardiff landed with the researcher. At the time, pressures of PhD write-up meant that the researcher initially declined organising the launch. However, it became apparent that without the researcher organising the launch in Wales it would not happen, and this might halt momentum and not be a good outcome for the initiative as a whole. There was no funding for the launch and the researcher undertook the work as part of PhD participatory engagement.

Given the lack of resources, a free venue was found in the form of a café in central Cardiff. The café agreed to host and the Community Land Advisory Service and ‘City Farms’ agreed to support the event by subsidising tea and coffee and soup for the attendees. WWF-UK gave a small amount of funding which contributed towards resources for the event. Friends of the researcher helped with social media and administration. The researcher organised, introduced, gave a presentation on Peas Please and facilitated a workshop on ways forward for Peas Please in Wales. Food Cardiff gave a talk about the Vegetable Retreat in Birmingham. The reason for outlining how this event was organised is to highlight that action is not always prohibited by lack of finance; what is important is using resources available, including human resources and networks. This is a key aspect of the Peas Please approach and is picked up again in Chapter 7 (Discussion).

The event was well attended with a full café of attendees which included, along with some local residents, Ark of Taste Wales, Cardiff University, Co-op Food group, Lantra, Welsh Assembly (Jenny Rathbone office), Public Health Wales, Cardiff City Council, Monmouthshire County Council, Welsh Government, Food Cardiff, Agroecology Land Trust, Brit Growers, Co Hydro, CLAS, Sustainable Food Consultant, Puffin, NPS, ‘City Farms’, Banc Organics, Cardiff Third Sector Council, Cardiff Community Housing Association, University of South Wales, Friends of the Earth, and a BBC Wales journalist. The broad range of attendees again showed the

spectrum of stakeholders capable of being brought together through the public health agenda, although there was a skewing towards NGOs and public sector with less business representation.

People who attended contributed their insights and most signed a Veg Pledge card stating “We pledge to play our part to help everyone in Britain eat an extra portion of veg a day”:

Figure 52. Veg Pledge cards from Cardiff launch.

‘Veg Pledging’ was taken to another level at the Summits where very specific pledges were made by stakeholders from across the food system on how they would contribute to increasing vegetable consumption.

The simultaneous launches in Cardiff, London and Edinburgh worked in terms of generating support, Veg pledges, enthusiasm for the initiative, and media coverage. In total 155 stakeholders attended and the launches received coverage on social media and in the Sunday Times, Mail Online, The Grocer, BBC Wales online, and other online media including the University of South Wales[22].

The Cardiff launch led to a number of key stakeholders contacting the researcher to discuss next steps for Peas Please in Wales. The Welsh Government’s Food Division played an active role by hosting an initial Wales Peas Please stakeholders

22 A summary of the launches can be found at https://wakelet.com/wake/1bb96693-c047-4f8c-a12c-29be0bfb68f8

meeting, including the researcher and representatives from The Ark of Taste (Wales), the Welsh Government, 'City Farms', Lantra and Food Cardiff. If the launch in Wales had not taken place it is unlikely that this group of stakeholders would have met and that the subsequent activities and support be offered, though Food Cardiff may have brought these stakeholders to the table in due course. This small group organised a 'Mini Veg Summit' event at the 'Welsh Government Pavilion' at the 'Royal Welsh Agricultural Show' in July 2017 and was also involved in the larger Peas Please Summit held in the Welsh Assembly in Cardiff (described later in this chapter). The use of events or moments of engagement, to build momentum for the initiative, is another distinctive aspect of the Peas Please approach. These techniques are obviously not unique to Peas Please but the combination of activities and practices, illustrated in this results chapter and more fully reflected upon in the following chapters, creates an overall approach which is perhaps new: in bringing multiple stakeholders together to break the cycle of declining production and consumption of vegetables in the UK.

6.5 Food Cardiff join project board

It became clear that there was a need for a Wales-based organisation with a credible reputation in the sustainable food arena on the Peas Please project board, in addition to the researcher. Since there was no all-Wales sustainable food organisation at this point, as discussed earlier, other options were explored. Food Cardiff, part of the Sustainable Food Cities Network, had established a good reputation for food system work in Cardiff through the work of a dedicated part time co-ordinator and in line with other Sustainable Food Cities, "a local cross-sector food partnership involving the local authority, public health, business, academic and third sector organisations" (King, 2017, p.4). Food Cardiff also had links to the wider food system and policy in Wales through, for example, involvement in the Wales Food and Drink Industry Board.

As a result of engagement with the research for this thesis, and subsequent involvement in the Vegetable Retreat and launch, Food Cardiff was invited to join the

Peas Please project board. Although the national nature of the work was beyond the remit of Food Cardiff, the benefits to the initiative and potentially to the food system in Cardiff, Wales and the UK were the rationale for joining. Food Cardiff joined the board with a shared vision and brought extensive established networks, skills, knowledge and commitment to action. It was key to pioneering the 'Veg Cities' work and ten pledges of the 41 pledges announced at the Summits. In many ways the processes used to try and achieve change by Food Cardiff were complementary to those used by Peas Please and these are further reflected upon in the next two chapters.

Food Cardiff had been undertaking aspects of Wales-wide work, for example through involvement in the Food Industry Board, food poverty work and the School Holiday Enrichment Programme (SHEP) which was piloted in Cardiff and then rolled out to other areas in Wales. Peas Please became another arm to this work and helped to establish Food Cardiff as a recognised organisation working on food system change at a national level alongside the Food Foundation and Nourish Scotland. Food Cardiff had been considering expanding its remit to justify engaging in Wales-wide work. Over the coming months it pushed through the establishment of Food Sense Wales which then received some funding from Welsh Government for Peas Please, further helping with the development of this organisation.

6.6 Eight workshops across the UK, January to March 2017

The next phase involved expanding the base of stakeholders involved in the initiative by convening workshops across the UK with businesses, government representatives, city authorities and Civil Society Organisations. There were eight workshops held in total, summarised here by the researcher:

1. **Veg in everything:** Reformulation (specifically adding more veg to ready meals) and product design.
2. **Veg on show:** Normalising veg consumption through advertising and marketing.
3. **Veg to go:** Improving veg offers in fast food, street food, sandwiches and snacks and workplace food.

4. **Veg direct:** New ways of getting veg to low-income consumers
5. **Urban veg:** Creating cities which support veg consumption through public procurement and planning.
6. **Outlook for veg:** Ensuring we have a thriving sustainable British horticulture sector post Brexit.
7. **Clever with veg:** Upskilling the catering industry to cook veg which is delicious.
8. **Veg everywhere:** Increasing the placement and promotion of veg on the streets and in the retail environment.

Figure 53. Peas Please workshops January–March 2017

The workshops were co-chaired by a project board member and a stakeholder from the supply chain, who jointly produced a briefing paper. Each workshop had a focus on desired outcomes but an openness on the process of how to achieve change. This shows the inclusivity and collaboration inherent in the Peas Please approach. This was one of the important aspects of practice and is revisited in Chapter 8 (Conclusion). The workshops helped to expand the evidence base and explore more fully what action might be possible, as well as further developing networks, support and buy-in.

The researcher was responsible for co-organising the 'Outlook for veg' workshop which looked at how to ensure a thriving, sustainable horticulture sector in the UK. This involved drafting a briefing paper and co-chairing with the British Growers Association. The workshop was held in London and again attracted a broad range of stakeholders from across the supply chain representing 'mainstream' and 'alternative' viewpoints[23]. This group was able to broadly agree on the barriers to horticulture, the offer, the influencers and the 'asks' of government. The outcome included a suggestion for a commitment from government to put in place special measures to support horticulture during and after the Brexit transition because of the unique risks and opportunities offered by the sector. Specifically, the group proposed it could

23 Attendees of the workshop included the British Growers Association, Soil Association, Regather (co-operative who run, among other activities, a fruit and vegetable box scheme), Food Research Collaboration, AHDB, NFU, the Landworkers' Alliance, University of Reading, Feedback, University of Hertfordshire Business School University of Roehampton, DEFRA, Former Director of Trade FAO and Asplins.

contain: a strong policy commitment to horticulture, a horticulture and labour plan, consumer subsidies, targeted investment in infrastructure and on farm trials, support for research and development, development of an open data platform between suppliers and retailers, a new model for Producer Organisations and support for them, a brand for UK fresh produce and a stronger role for the Groceries Code Adjudicator. How work on this developed is discussed in the 'SME Horticulture and Fruit and Vegetable Alliance' section, and is influenced by the themes of divergence and power in the food system, and the ability of public health to offer convergence.

Food Cardiff co-chaired the Urban Veg workshop with Sustainable Food Cities further developing buy-in. This work went onto inform the development of a commitment around a new 'Veg Cities' Sustainable Food City campaign.

Results of the workshops directly translated into a commitments framework which was further commented upon by wider stakeholders through online consultation. A total of 116 stakeholders were involved in the workshops and 77 stakeholders commented by email. The process mirrors the PAR cycle of research, action and critical reflection, and hence the complementarity of PAR with the initiative, discussed in more detail in the following chapters.

6.7 Commitments framework, April to June 2017

Having engaged with multiple stakeholders, the project board condensed the information into a framework to inform action across the food system. The result was a list of 12 commitments to increase the production, availability, affordability (particularly for those on low incomes), and perception of vegetables clustered around the areas of shopping and eating at home, eating out, towns and cities, children, and production (see Appendix 9).

Commitments were chosen, as much as possible, to capture a range of realistic actions possible by stakeholders. Some aspects of food system change were not captured within the first commitments framework, despite considerable engagement. For instance, the chef 'clever with veg' training at the time of the development of the framework had no obvious levers or stakeholders. However, subsequent work by WWF-UK and The Sustainable Restaurant Association led to developments in this

area. This pragmatic approach and making use of available levers is important and is an aspect of practice picked up again in Chapter 8 (Conclusion).

The framework formed the basis for approaching stakeholders for Veg Pledges based on a specific commitment. This ‘outcome focussed but flexible about process’ approach is a key tool used by Peas Please practitioners and enabled multiple and diverse stakeholders to engage in a way which was in line with the outcome of the overall initiative but which suited their circumstances. This is discussed in more detail in the next two chapters.

6.8 Mini summit 25 May 2017

The mini summit in the Welsh Government Pavilion at the Royal Welsh showground was a product of the work of a Wales Peas Please steering group, and particularly Food Cardiff. This expansion of the stakeholders involved in Peas Please in Wales was another key moment for the initiative, taking it from the fringes and into the mainstream. Being hosted by the Welsh Government at the Royal Welsh Showground, and the event being attended by the Cabinet Secretary for Energy Planning and Rural Affairs was an endorsement of support for Peas Please at governmental level. The likely reasons for the support for this initiative are explored more fully in Chapter 7 (Discussion) in relation to power in the food system.

The researcher gave a presentation, similar to the one outlined in Appendix 6, highlighting the fruit and vegetable deficit in the UK and Wales, and the opportunity for increasing production and linking this with the Peas Please initiative and links to the supply chain. This was then followed by a panel discussion chaired by the head of the Food and Drink Industry board. The panel represented the cross section of stakeholders in the supply chain and included representatives from Castell Howell, Puffin Produce, ‘City Farms’, WRAP Cymru and a Wales-based teenage fruit and vegetable gardening blogger. The event was attended by a wide range of stakeholders, representing a cross-section of sectors and production types, as well as Welsh Government officials. Again, the ability of the ‘public health platform’ to bring a diverse group of stakeholders together on a level playing field was illustrated.

A similar event was held by Nourish Scotland at the Highland show, indicating the willingness of the devolved nations to make the links between production and

consumption. It also showed the benefits of the devolved nations where close links between Government and a range of potential facilitators of change are possible.

6.9 Veg Pledges

The period after the development of the commitments framework and before the Summits was a time consuming period of negotiation establishing as many specific pledges as possible based on the framework. Forty-one stakeholders made Veg Pledges in all. The Food Foundation were able to use their networks, reputation and skills to link into head offices of major food service providers, Government, producer organisations and retailers to secure 26 of the 41 pledges. Pledges secured were with Defra, National Farmers' Union (NFU), Lidl UK, Sainsbury's, Mars Food UK, Our Kitchen, Tesco, Co-op, Nestle UK, Birds Eye, Association of Convenience Shops, Sustainable Restaurant Association, Greggs, PricewaterhouseCoopers (PwC) and Baxterstorey, Bidfood, Sodexo, Interserve, Simply Fresh, The Healthy Food Company, Soil Association, The Plough Harborne, Birmingham City Council, Brighton & Hove, Redbridge, WRAP and GroentenFruit Huis (Fresh Produce Centre) The Netherlands. Details of all the pledges can be found in Appendix 10, and their significance is explored more in Chapter 7 (Discussion), but some examples of the diversity of pledges are given here:

> "On top of our existing work to promote veg consumption, we pledge to include a weekly feature on our social media of vegetables and advertise at least one seasonal vegetable in our magazine, online and on our social media every month. We will promote Peas Please to our customers and indicate which cooking sauces include one of your five a day where possible. We will put vegetables at the top of the agenda when planning to retail new product design across all our food categories and increase veg options in our lunchtime meal deals." (Co-op)

> "We pledge that 100% of Greggs soup and leaf-based meal salads will provide at least one portion of veg. We commit to grow the like-for-like volume each year between January 2018 and October 2020. Through these ranges we will sell an additional 15 million portions of veg over the period from January 2018 to October 2020. We also pledge that 50% of Greggs cold sandwiches will provide half a portion of veg. Increased use of veg and salad will be a new strategic criteria for New Product Development." (Greggs)

> "We pledge to update all of our retail Maggi dry recipe mix, stock cube and stock pot meal recommendations to include at least two portions of vegetables per serving (on-pack and online) by the end of 2018. This will encourage 3 million people who buy these Maggi products every year to eat more veg." (Nestle UK)

> "We pledge to pack a portion of veg into every main meal, and our risotto will be made with veg from local allotments." (Our Kitchen)

Food Cardiff, as well as making a pledge themselves, helped secure nine other pledges. Many of the pledges were facilitated by Food Cardiff's established networks and relationships with stakeholders. Cardiff Council, Cardiff University, Cardiff and Vale University Health Board, Cardiff Metropolitan University, Riverside Real Food and Penylan Pantry all made Veg Pledges in line with helping Cardiff become a 'Veg City'. 'Veg Cities' was adopted as the next campaign of Sustainable Food Cities and was very much related to Food Cardiff being on the project board.

Two new relationships and subsequent pledges were developed by Food Cardiff in the form of links to Castell Howell and Brains Brewery Chain. Castell Howell is a key stakeholder as it wholesales food across Wales into food service companies and it also supplies into retailers. They made a pledge to increase the vegetable content of a number of their ready meals:

> "We will endeavour to increase the vegetable content by up to 20% to a minimum of 80g in a further 5 product lines during 2018 with projected sales of around 150, 000 portions. By the end of 2018 we will aim for 21 of Authentic Curries and World Foods Company's ready meal lines to contain a minimum of one portion of veg and we will endeavour to ensure that all new product development contains a minimum of 1 portion of veg where appropriate." (Castell Howell)

Brains Brewery chain also committed to increase the number of portions of vegetables offered as standard in children's meals from one to two:

> "We pledge to increase the portions of veg in children's meals from one portion to two, working to implement in 30–40 of our restaurants in year one. We also commit to training our staff to enable a culture that supports veg choices and therefore promotes vegetable consumption with our customers." (Brains Brewery Chain)

Castell Howell and Brains were particularly significant given the potential consumer reach and influencing effects on other parts of the food chain. Castell Howell sales staff across the regions of Wales went on to receive Peas Please training, by Food Cardiff and the researcher, and engaged in detailed discussion as to how to influence increased vegetable sales.

The researcher, with links to producer organisations in Wales secured three production orientated pledges, Tyfu Cymru (Lantra), Puffin Produce and Tyfu Fynu, Social Farms & Gardens, Wales. The production pledges showed commitment to increasing production at a range of scales in Wales, and illustrated a convergent approach. Puffin Produce, a large-scale production co-operative committed to increasing production of vegetables by 50% by 2020. Tyfu Cymru, an RDP-funded initiative aimed at supporting the commercial horticulture sector in Wales, made a pledge to produce a commercial horticulture action plan, and Tyfu Fynu made a pledge to support community growing. To some extent, these were activities which were already planned, and this was noted for monitoring purposes; however the important aspect was that all three scales were represented and shown to be coming together on the 'public health platform'. Nourish Scotland helped secure the Scottish Government and Scottish Grocers' Federation pledges. The reasons why Nourish Scotland did not secure more pledges at this stage are explored in the divergence and convergence section of Chapter 7 (Discussion).

Some commitments from the framework remained 'pledgeless' despite considerable work. For instance the Food Foundation had spent time trying to get the BBC to sign up to a vegetable pledge under the commitment "Broadcasters commit to giving veg a good image on kids' TV by developing guidelines for producers". A pledge was not made and this commitment remained pledgeless until the Food Foundation initiated work on a veg advertising poster competition outlined in a later section.

To some extent the first round of Veg Pledgers consisted of businesses and organisations already interested and proactive in increasing vegetable production and consumption. However, in the pledge development an attempt was made to push these pledgers further to commit to new actions. Whether pledges were based on existing planned activities or were new was noted as part of the monitoring process. The first pledgers were seen as 'trailblazers' and role models for others to follow, and this was used as a hook, in terms of possible publicity, to push stakeholders to pledge in time for the first Summits. It could be said that the initiative went for the low-hanging fruit in the first round of pledges; and to some extent this criticism is warranted, but it showed the pragmatism of the approach. The perception was that there was a need to start somewhere, and engaging with stakeholders who are interested provided the best opportunity to develop the initiative before moving on

to more challenging areas. It was also a reflection on the process of change which involved working with key individuals within businesses or organisations who were enthusiastic about the initiative and the desire for change. This is reflected upon in the concluding chapter.

During the year following the 2017 Summits, a strategic decision was made by the project board to consolidate, monitor and evaluate the first round of pledges before actively engaging more pledgers. Whether all the pledges will be effective in increasing availability and production of vegetables and whether these translate into changes to consumption is unknown, but the Peas Please project board established a monitoring and evaluation process to attempt to rigorously track this.

6.10 Summits 24 October 2017

Figure 54. Vegetable Summit logo.

The Summits were used as an opportunity to announce the 41 pledges and create a media event. Having them spread across the UK, albeit not in Northern Ireland, was a logistical challenge, but added to the reach of the day. The London Summit, organised by the Food Foundation, was high profile with television and radio celebrities; for example: Sheila Dillon from the BBC Radio 4 Food Programme, Rangam Chatterjee, Bee Wilson, Hugh Fearnley-Whittingstall and George Eustace among others, who all contributed to discussions on a number of panels alongside the announcement of the Veg Pledges. The major retailers announced their pledges at this event. The Summits in Edinburgh and Cardiff concentrated more on making links to government and on discussion and showcasing what had been achieved to date. The researcher was involved in organising the Summit in Wales alongside Food Cardiff and this section concentrates on that Summit.

The Wales Summit was sponsored by Jenny Rathbone AM, chair of the Cross-Party Group on Food, and held in a Welsh Assembly venue in Cardiff bay. The event received funding from Welsh Government, Puffin Produce and Castell Howell showing the partnership working between NGOs, business and Government. It was chaired by the ex chief executive of the Food Standards Agency who had extensive experience with working with stakeholders from across the supply chain.

The format of the event was interactive with the large conference room set out with pledger stalls to represent the food system, much akin to the diagram which the researcher had used to represent the food system (see Chapter 3 (Methodology), Figure 25). The pledger stalls represented the diversity of small and large-scale, 'mainstream' and 'alternative', NGOs, academics, public health business and Government, and showed convergence in action. They included Penylan Pantry, Cardiff and Vale Health Board, Tyfu Cymru (Lantra), Castell Howell, WRAP Cymru, Brains, Puffin Produce, 'City Farms', Cardiff Met University and Cardiff University. Each pledger announced their own pledge at a key moment, inter-mingled with pledge announcements from the larger retailers and food service providers from the other Summits. Pledgers were given an opportunity to speak, though there could have been more time given for debate. Councillor Huw Thomas, Leader of Cardiff Council, gave a speech and announced Cardiff Council's pledge to undertake a range of activities to increase vegetable consumption at a city level, and Dr Sharon Hopkins, Director of Public Health with Cardiff and Vale University Health Board, announced their pledge (see Appendix 10).

The Children's Commissioner for Wales attended the Wales Vegetable Summit and spent time, along with public health practitioners, talking with a panel of children from St Ninian primary school about their preferred poster from an advertising competition held for design agencies to design a poster to get children to eat more vegetables. The children's choice in Cardiff was then passed on to John Heggarty and Hugh Fearnley-Whittingstall in London, along with the choice of children's panels in Edinburgh and London. The winning poster was then announced at the Summits as Veggie Power, later to become Veg Power:

Figure 55. Winning poster Veggie Power, later to become Veg Power.

The event was attended by over 80 multi-disciplinary representatives from the private, public and third sector, representing a diverse range of stakeholders[24].

The National Assembly for Wales caterers provided a vegetable filled buffet which reflected the ethos of the Summit. It was also attended by nine Assembly Members, two Welsh Government Ministers[25] and a number of Welsh Government civil servants. During the National Assembly for Wales Plenary on the day, the First Minister Carwyn Jones welcomed the Peas Please Veg Summit (National Assembly for Wales, 2017c) (see Appendix 12 for details). The event and the Castell Howell pledge also received ITV Wales and Business Wales coverage.

In Wales, a food system approach to increasing fruit and vegetable consumption had gone from a theoretical idea being presented by a lone researcher to mainstream exposure within two years. This was achieved through a range of actions, particularly making use of established networks and key individuals as facilitators of change, discussed in Chapter 7 (Discussion).

6.11 Monitoring and evaluation, strategy board and advisory board

24 SFC Soil Association, Cynnal Cymru, Church in Wales, One Fox Lane, Bishops, Ark of Taste Wales, Green City Events, Vegan Society, Green Grocers, Fareshare Cymru, Riverside Community Market Association, Egg Seeds, Grow Cardiff, Monmouthshire County Council, Inspire Create Educate, BCBC Catering Services, WWF, Food Network Wales, Ashfield Seed to Saucepan project, Menter a Busnes, Welsh Local Government Association (WLGA), Farming and Countryside Education (FACE), Huw's Nursery, Cardiff Third Sector Council (C3SC), Mezza Luna, Riverside Real Food, Brit Growers, Ninian Park Primary school children, the Community land Advisory Service and the University of South Wales.
25 Cabinet Secretary for Health, Wellbeing and Sport, Vaughan Gething and the Minister for Social Services and Public Health at the time, Rebecca Evans.

The success of Peas Please partly rests on pledgers following through on their commitments and those commitments translating into increased purchase and ultimately consumption of vegetables. In order to track this, a detailed monitoring and evaluation strategy was developed by the project board.

To ensure a rigorous approach, a wider group of stakeholders was recruited to advise on the evaluation strategy. These formed a new Peas Please strategy board and comprised representatives from the Centre for Diet & Activity Research (CEDAR) at Cambridge University, the Sustainable Restaurant Association, PwC UK, Kantar Worldpanel, WRAP and Sustain[26].

An advisory board was also put in place to advise on the overall strategic direction of Peas Please[27]. The former chief executive of the Food Standards Agency, who chaired the Wales Summit, became chair of the advisory board. This expansion of stakeholders involved, as well as representatives from all the UK nations, added to the credibility and accountability of the initiative. It was hoped that Peas Please would also receive external evaluation, although details of this have yet to be decided.

The monitoring and evaluation framework sets out how the pledges will be monitored. Around half of the pledges directly relate to increasing the availability of vegetable portions; the other half indirectly relate; for example, 'The Association for Convenience stores Award' for convenience retailers who increase sales and encourage consumption of fresh fruit and vegetables. For those that indirectly relate, the monitoring will be qualitative in the form of self-reporting and case studies.

Those that directly relate to portions fall into two broad categories: food in the home (retailers) and food out of the home (food service and food on the go businesses). For these quantitative data on amount of extra vegetable portions purchased will be collated.

In the retail sector this will be captured by Kantar data on vegetable sales by weight as a proportion of sales. Obviously this will include increases and decreases of sales

26 For details see https://foodfoundation.org.uk/peasplease/the-peas-please-boards/
27 The advisory board comprises representatives from Welsh Government Food Division/Public Health, the British Growers Association, Association of Convenience Stores, Standards and Dietary Health team in the Food Standards Agency Northern Ireland, Dutch Fruit and Vegetable Action Plan, Scottish Government Health Improvement Division, On purpose, Wellcome, Harborne Food School (Birmingham), Tesco, Defra, Public Health England Obesity Programme Board member and Oxford University.

for other reasons, and this will have to be integrated into the interpretation. The UK baseline statistic for 2016, is estimated by Kantar to be 7.2% of the average shopping basket by weight being vegetables. According to healthy eating guidance ('7 a day') this figure should be 20%; though this does not account for household waste.

For the food service and food on the go sectors this metric is harder to capture, and these pledges will be monitored through two metrics: the increase in the amount of veg procured, captured as portions (baseline compared to target), and the increase the average weight of vegetables per cover, multiplied by the number of covers and captured as portions (baseline compared to actual). This will be calculated from self-reports and spot checks.

That the present 41 pledges will lead to the scale of change needed to get the population eating '7 a day' is unlikely. The Peas Please progress report (Food Foundation, 2018b) shows that an additional 4.8 million portions of vegetables were sold by Peas Please pledgers, compared to baseline, over the first 8 months.

The fruit and vegetable requirement is and was a useful tool here to put the 4.8 million extra portions in perspective. Although it may sound like a large sum, when compared to the scale of the challenge it is small. Converted from million tonnes into portions, the vegetable requirement of the UK Population is around 75 billion portions. Currently consumption is estimated to be around 48 billion portions:

Figure 56. Peas Please slide from presentation used to engage stakeholders on the scale of the vegetable consumption challenge.

Another 4.8 million portions purchased minus household waste of 22%, would increase consumption by around 3.9 million portions to 48.0039 billion, effectively still leaving just under 37 billion portions to meet the requirement.

The requirement figures were used at the project and strategic board levels as well as at the Pledgers' Retreat in order to illustrate the scale of the task in hand and to establish whether Peas Please should set a target. After consideration it was agreed to use the target for internal monitoring and evaluation purposes rather than an external published target. More pledges were announced in October 2018 and this might increase the amount of vegetables purchased; but the size of the challenge and ability of voluntary agreements alone to affect the scales of change needed are debated, this is discussed in more detail in Chapter 7 (Discussion).

6.12 Veg Power 2018

Veg Facts (Food Foundation, 2016c) had established that only 1.2% of food advertising goes on vegetables. The vegetable poster competition at the Summits and gathering of stakeholders by the Food Foundation to discuss vegetable advertising led to the development of an idea to set up a vegetable advertising fund to try and increase the amount of money spent on vegetable advertising. The winning Veg Power poster, depicting a boy holding up carrots to his head in order for his shadow to resemble Batman's, was launched in January 2018 on the day that the vegetable advertising budget for the year would theoretically be used up by. This created a media moment to make the case for a new vegetable advertising fund. Hundreds of people across social media took and shared photos of themselves holding carrots up to their heads in imitation of the poster. Food Cardiff organised with the Welsh Local Government Association for the poster to be distributed to schools across Wales and this resulted in many schools showing the poster and contributing photos to the campaign. Many of the photos were taken by pledgers' staff, for instance caterers of Cardiff and Vale Health Board and staff at Castell Howell:

Figure 57. Veg Power poster launch and photos showing engagement.

The diversity of approaches adopted, including ones which involved a bit of fun, was core to Peas Please.

Food Cardiff also, along with local partners, organised for a copy of the Veg Power poster to be graffitied on a wall near the Principality Stadium (see Figure 57). This was filmed by Hugh Fearnley-Whittingstall's production team. Nourish Scotland also succeeded in projecting the poster onto City Chambers in Edinburgh and this was also filmed along with footage of the London Vegetable Summit. These were later shown on Hugh Fearnley-Whittingstall's Britain's Fat Fight programme on BBC One, and were used as a communication opportunity, helping to launch a crowdfunding campaign for a vegetable advertising fund.

The development of Veg Power was facilitated by the work of an advertising expert who had worked for much of his career promoting unhealthy foods. He developed diabetes and consequently decided to use his skills to promote healthy foods. He and his team initially did the work on Veg Power for free. This is common to the Peas Please approach, reflected on in more detail in Chapter 7 (Discussion), that it is individuals within the system, dedicated to the cause, that are key to facilitating change.

The Veg Power fund, as it became known, raised £123,557 by June 2018 with contributions to the public crowdfunding appeal including AHDB, NFU, BGA,

Birdseye, Bakkavor, Ellas, Innocent, Tesco, Sainsbury's, Tesco, WWF-UK, Paul McCartney, Sodexo, and the Welsh Government, among others. The range of supporters shows again the ability of the public health platform to gather a diversity of actors connected to the food system. That the Welsh Government agreed to put money into the pot was in large part due to the track record of Peas Please in Wales, and to Food Cardiff. The funding will be used to develop the proof of concept, and vegetable advertising in the UK. Whether this will be enough to counter the advertising of less healthy foods is unknown and discussed at more length in Chapter 7 (Discussion).

6.13 Small to Medium scale Enterprise (SME) Horticulture group and Fruit and Vegetable Alliance 2018

A group of stakeholders including AHDB, the British Growers Association and NFU along with the Food Foundation were the main stakeholders who were to take the UK production commitment forward from the commitments framework.

It was a role of the Peas Please team to try and ensure representation from a broad range of growers and so the Landworkers' Alliance were kept in the loop for subsequent meetings. AHDB, the British Growers Association and NFU were not necessarily overly comfortable with this as the views of the Landworkers' Alliance, who advocate food sovereignty and agroecological small-scale farming are often counter to the industrial paradigm which the other bodies are aligned with; and indeed, in subsequent meetings, tensions arose between the NFU and Landworkers' Alliance over differences in perspectives, and these had to be mediated.

The Food Foundation was trying to aid the development of a Defra Fruit and Vegetable Roundtable in order to develop the fruit and vegetable sector and make links to consumption. Defra was keen to progress this but was clear that the Food Foundation could not lead the development, and that it had to be industry led. Development was left to large-scale industrial horticulture stakeholders and progress stalled. It was difficult to see how to get around this. However, the answer came from work with SME growers and highlights that power to influence can be achieved through strength in numbers. This is elaborated on Chapter 7 (Discussion).

A criticism of the Peas Please Summit in London was that there had not been enough involvement of SME growers and the 'alternative' food system. The Scottish Summit organised by Nourish Scotland had been dominated by SME retailers and producers who had found it hard to see how they fitted into Peas Please which appeared to be dominated by large-scale retailers and producers. In Cardiff convergence had been effectively achieved by having a range of producers pledging and a range of scales of retailers and food service providers.

At a meeting of the project board it was noted that there was a need for Peas Please to engage with SME producers and the researcher was tasked with this work, given the links with work for this thesis. The aim was to help establish the evidence base for SME production in order to help the sector to effectively lobby. This was a way of helping SME producers without aligning Peas Please with any sort of production technique, a strategy which had previously proved so divergent. Maintaining a platform where multiple stakeholders with different takes on how the food system should be run was key to the approach and practice.

The researcher, along with the Food Foundation, Land Workers' Alliance and the Soil Association, met initially to discuss ways forward and agreed to organise a meeting of SME producers at the Soil Association offices in Bristol. This meeting was attended by Sustain, The CSA Network UK, Bristol Food Producers, The Community Farm (Bristol), Growing Communities, The Landworkers' Alliance, the Soil Association, Tyfu Cymru (Lantra), 'City Farms' (Tyfu Fyny), Organic Growers Alliance, and the researcher on behalf of Peas Please.

The researcher gave a presentation about the fruit and vegetable requirement and the deficit in terms of production and consumption, and this helped set the scene on the scale of the challenge and the need for collaboration. This was another example of research being used to try and influence change and was a key approach not just of the research for this thesis but of Peas Please. There was broad agreement on the need for collaboration between SME producers, of all production types, and the group agreed to work together to gather the evidence on the benefits of SME fruit and vegetable production. The researcher composed an email with the logos of all the membership organisations calling for evidence, which was distributed widely. Many responses were received not only from academics but from organisations and

producers. The researcher, along with a small group of SME stakeholders, helped to integrate this research into a document on the benefits of small-scale fruit and vegetable production which was shared within the group. This happened at a time when the UK Government had issued its agriculture consultation ‘Health and Harmony’ which was to decide the shape of agricultural support in the UK post Brexit. The evidence base was used directly in consultation submissions by the SME stakeholders, particularly the Landworkers’ Alliance, to make the case for SME horticulture.

The SME membership was later expanded to include the Kindling Trust and Organic Farmers and Growers. Given the establishment of the SME horticulture group and the aim of Peas Please to facilitate closer links with Defra through the establishment of a Fruit and Vegetable Roundtable, the researcher suggested that a way around was for the SME horticulture group to be the basis for an industry group, thereby bypassing the large-scale producers who had been stalling progress.

The SME group agreed with the approach but did not want to alienate the NFU. An agreed way forward was to ask whether other large-scale horticultural producer support organisations would like to join in the first instance. The Food Foundation, with their links, recruited the British Growers Association in the first instance and the roundtable progress was restarted. The problem then arose as to who would chair the roundtable given the divergent membership with varied views. This was a sticking point. Peas Please or the Food Foundation, not being industry, could not chair; but the ‘public health platform’ was the main aspect bringing all the stakeholders together. In order to circumvent this and to enable the sorts of strategy development necessary, the researcher suggested (as per thesis recommendations (see Appendix 13 for summary)) that a new Fruit and Vegetable Alliance be formed between small, medium and large-scale producers. This Alliance could be chaired initially by Peas Please or the Food Foundation and form the basis of the roundtable.

This was suggested to the SME horticulture group, in the form of another presentation where potential targets for home production, based on the fruit and vegetable requirement, were shared as the basis for a raison d’être for a new Alliance. This was later translated, in combination with research for this thesis on barriers to horticulture, into a two page document for use by the Alliance (see

Appendix 11). The SME group agreed with the approach and the Food Foundation took the lead in the establishment of the Fruit and Vegetable Alliance. The SME horticulture stakeholders were joined on the Alliance by key large-scale growers: the British Growers Association, Asplins, G's Produce, Produce World Group and British Summer Fruits. This gave the Alliance the representation necessary for Peas Please to go back to Defra and agree to start up an Edible Horticulture Roundtable. Without the more neutral 'public health platform' offered by Peas Please it is unlikely that this Alliance formation would have been possible. The Fruit and Vegetable Alliance was launched by the Minister of State of Defra, George Eustace, in July 2018, and the first roundtable meeting was held in September 2018.

The research recommendations from the barriers section of this thesis fed directly into action, in line with the objectives of PAR, and an SME horticulture group was established as well as a broader Fruit and Vegetable Alliance linked to a Defra Edible Horticulture Roundtable. This work was directly facilitated by linking production and consumption, the fruit and vegetable requirement of the population and the systemic public health approach of the research for this thesis and of Peas Please. Updated fruit and vegetable requirement data (2016 figures) was integrated into the Fruit and Vegetable Alliance's two page position paper and used in an infographic to show the deficit and the need for increased production, see Figure 58:

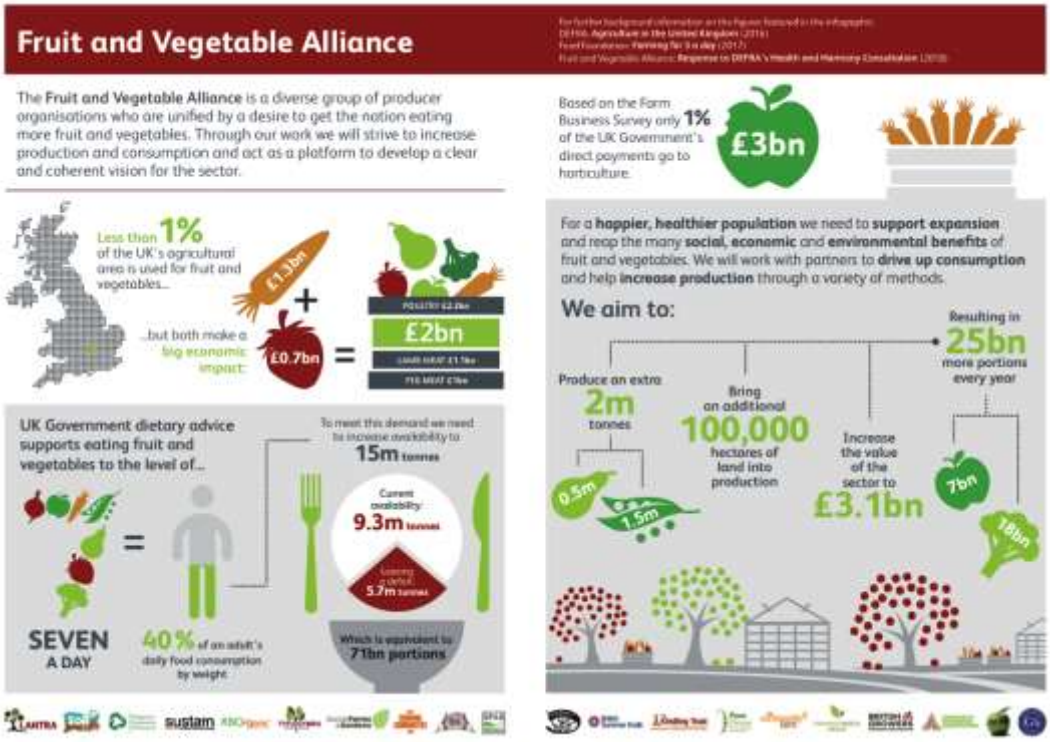


Figure 58. Infographic with updated fruit and vegetable requirement data (2016) used to launch the Fruit and Vegetable Alliance, July 2018.

The work on the fruit and vegetable requirements had, to some extent at the time, reached a limit to what could be achieved in Wales; but engaging at a UK level helped to facilitate the development of networks and make the public health case for fruit and vegetable production just at a time when UK Government was entering a period of consultation on post-Brexit agricultural policies and support. PAR in this case, and particularly the Solidarity Action Research approach, helped to facilitate the establishment of the SME horticulture group, the Fruit and Vegetable Alliance, and the Defra Edible Horticulture Roundtable, all of which might lead to a stronger, more supported and strategic UK fruit and vegetable sector.

6.14 Peas Please as a facilitator of change?

The progress of the initiative is a credit to the Food Foundation whose plan of action in the form of the original concept note and following work proved so effective in

building support for the Peas Please initiative and building buy-in from across regional and central government, food system businesses and NGOs. The different stages and key events helped build momentum and create key tipping points where action was facilitated. This targeted, outcome-focused approach helped engage business stakeholders, with limited time, in an initiative which was not necessarily core to their everyday running. This was an achievement and was related to the flexibility of the approach. This work however did not just happen by itself. It took considerable time and effort to make links and negotiate divergent sectors and actors within the food system. The whole of the project board was involved in intense negotiations across the nations. The sheer rate of work of a small project board with scant resources, drawing on volunteers and sometimes working for free themselves, has resulted in considerable outcomes and impacts over the last two years.

A traditional view of NGOs and academics in relation to the food system is illustrated in the 'Vermont Farm to Plate Strategic Action Plan' (Vermont Strategic Jobs Fund, 2013, p.8) (see Chapter 2 (Literature Review), Figure 9). The illustration shows the 'support system', policy makers, government, NGOs, trade associations, researchers, funders and so on, as outside influencers of the food system. The research for this thesis suggests that there is however a role for NGOs and researchers and other 'support system stakeholders' in the middle of the food system, catalysing change in the interest of a public good by acting as facilitators linking the different parts of the food system. In effect these stakeholders are acting as hamsters driving the food system wheel in the interests of public health, as illustrated below:

Figure 59. Food system approach to increasing vegetable consumption as adopted by Peas Please.

What it takes to attempt to drive the food system wheel was experienced by the researcher as part of Solidarity Action Research. It is this experience, alongside reflection on the activities of the rest of the project board, which helps to inform the suggestions on what is required in order to undertake this approach. Many suggestions have been made in this chapter but the concluding chapter brings these points together into a cohesive argument.

In terms of reaching influencers of the food system, the Peas Please initiative has been effective as illustrated by the range and scale of stakeholders engaged; for instance, the retailers who have made Peas Please pledges represent half the retail sector. Whether the pledges will actually increase the availability and production of vegetables and whether this in turn results in increases in consumption at a sufficient scale is discussed in more detail in Chapter 7 (Discussion). What is clear is that there has been an attempt to influence these agendas and that the work has succeeded in breaking the 'chicken and egg' situation to at least get stakeholders, businesses and government, with the help of NGOs and academics from across the food system committing to increasing production and consumption.

6.15 Reflection on research questions

This thesis is concerned with answering the question of ‘how is greater food security and sustainability best achieved?’ (see section 2.13). The first area of enquiry was to explore whether convergence is facilitatory and this was broken into three parts, the first and second parts were explored in Chapter 4 (Requirement) but the final one, ‘can a convergent food system approach to public health nutrition lead to change?’, was explored in this chapter. Also explored was the third main area of enquiry which was ‘can Participatory Action Research (PAR) help facilitate change?’

Combining production and consumption alone failed to address the barriers to increasing production and consumption of fruit and vegetables experienced by producers. Greater convergence, in the form of engagement with multiple stakeholders from across the supply chain, as part of Peas Please, has potentially managed to transcend some of the barriers and offers the potential to increase consumption and production of vegetables, though it is unclear yet whether it will. This is discussed in more detail in Chapter 7 (Discussion).

Using PAR early in the research process helped to make the case to stakeholders in Wales for a more systemic approach to improving diet. Explaining, through the PAR process, that the consumer focussed ‘5 a day’ campaign had not been effective at delivering dietary change and introducing the fruit and vegetable requirement to a wider group of stakeholders, opened up the idea that a new food system approach may be required. The research findings, such as the ‘2%’, were subsequently quoted widely for lobbying purposes. This was a potentially necessary step to paving a new path for change in Wales. However, presenting the research was not enough in itself to facilitate change. At the time of the research there was no available mechanism at a UK level to increase consumption and production of fruit and vegetables simultaneously. Participatory Action Research was facilitatory in that critical reflection suggested that there was a need for greater convergence in order to achieve change. This involved going on to seek and collaborate with more stakeholders from the supply chain and more stakeholders at a UK level.

Participatory Action Research enabled the researcher to engage in the development of a new UK initiative to increase vegetable production and consumption. This addressed some of the barriers which had emerged from stakeholder engagement

and actioned some of the suggested enablers. The establishment of the UK Fruit and Vegetable with a link to a Defra Edible Horticulture Roundtable, for instance, brought producers from ‘alternative’ and ‘mainstream’ sectors together under one umbrella and this convergence has the potential to facilitate greater production of fruit and vegetables.

Engaging in PAR and using a food system approach involved a range of practices which were complimentary and possibly facilitatory of change. These were working in a space of possibility, representing a public good, identifying potential levers for change, working with people as facilitators of change, simultaneous engagement, co-production, using established networks, plugging gaps in activity and being fun and positive. These are explored further in Chapter 7 (Discussion), section 7.5.1.

Personal diplomatic practices adopted to undertake this work were a clear focus on vision but a flexibility on how to get there, empathy and inclusivity, navigating power dynamics, humility, being social, pragmatism, communicating research simply and well, using the art of the possible and power of the positive, persistence and being a reflective practitioner. These are discussed in more detail in Chapter 8 (Conclusion) under the title of a new food diplomacy (section 8.3).

6.16 Summary

This chapter outlined the involvement of the researcher through Solidarity Action Research (a type of PAR) in the development of Peas Please, a national initiative aimed at increasing the consumption of vegetables through a food system approach. It gave a history of the initiative, detailing the Vegetable Retreat, the launch of Veg Facts, Food Cardiff’s decision to join the project board, the participatory workshops leading to the development of a commitments framework, the Veg Pledges from across the supply chain and the 2017 Vegetable Summit. It then looked at monitoring and evaluation, Veg Power and the development of the Fruit and Vegetable Alliance before reflecting on Peas Pleases role as a facilitator of change. Chapter 7 (Discussion) moves on to look at the key themes, established in Chapter 2 (Literature Review) and emergent from the research, including: where the research and Peas Please fit into the neoliberalism/neoliberalisation debate; divergence, convergence and spaces of possibility; linking production and consumption; the Peas Please food

system approach compared to others; impacts of the Peas Please approach; political ecology issues such as power, place, scale, space and networks and a reflection on PAR. Chapter 8 (Conclusion) reviews the thesis, and the results of the research and discussion, and combines this into a summary of what it might take, in terms of practice, to achieve food system change for better nutrition.

7 Discussion

7.1 Chapter overview

As established in Chapter 2 (Literature Review), the context for this research is the problems of the modern neoliberalised food system; particularly around food security and sustainability[28], and the divergent solutions being proposed. This chapter returns to neoliberalisation and suggests that the research for this thesis lies in the realms of 'post-neoliberalised' or 'not quite neoliberal' food system development. It then goes on to explore divergence in the food system and looks at the benefits of convergence and how the fruit and vegetable requirement and a food system approach may be facilitative. It also explores the complexities and drawbacks of convergence. The food system approach adopted by Peas Please is described and compared to other approaches, and the advantages and disadvantages are discussed. Whether this approach can lead or has led to systemic transformation around increasing vegetable consumption is debated. The chapter then turns to theory to explore how the research findings of this thesis might contribute, particularly in relation to food systems, political ecology and Actor Network Theory. The final section reflects on the Participatory Action Research process, its potential weaknesses and strengths.

7.2 'Not quite neoliberal'?

Returning to the explanation of neoliberalism used in Chapter 2 (Literature Review), although it is a "messy bundle of contradictions" (Moore, 2010, p.389), the general effect, through the process of neoliberalisation (Castree, 2010), has been that it has:

> "guided policy efforts to privatize public resources and spaces; minimise labour costs … reduce public expenditures on entitlements, subsidies and other sorts of redistributive welfare; eliminate regulations seen as unfriendly to business, especially health, labour and other protections; and reduce taxes in order to spur more private investment." (Guthman, 2011, p.17)

28 As per Chapter 2, sustainability is conceived of as comprising economic, environmental and social sustainability, and defined along the lines of the 'Our Common Future' Brundtland report; sustainable development "meets the needs of the present without compromising the ability of future generations to meet their own needs", World Commission on Environment and Development 1987. Our Common Future. Oxford: United Nations.

In food terms, neoliberalisation has generally meant that governments have ceded responsibility for food security planning to the market. In terms of food consumption, over the last 40 years, this has been associated with a rise in malnutrition associated with high energy, low nutrient diets, and a rise in obesity worldwide. This may be because with increasing commodification of food under neoliberalisation, success in the 'mainstream' food system has tended to be framed in terms of financial output rather than other outputs such as food security or sustainability (Schoen and Lang, 2016). For instance, the maximisation of profit rather than more ethical concerns have tended to drive food promotion, hence the two biggest spends, accounting for 60% of food advertising, are prepared convenience foods and confectionery; when only 1.2 % of the spend is estimated to be on fruit and vegetables (Food Foundation, 2016c).

Neoliberalisation has not, therefore, delivered quality diets for all, particularly the poor. A study by Jones *et al.* (2014) found that more healthy foods in the UK are now consistently more expensive than less healthy foods, with the gap widening; healthy foods being approximately three times more expensive per calorie than less healthy. The Food Foundation (2018a) have also produced evidence to show that for those households in the bottom two income deciles, earning less than £15,860, consuming foods according to the 'Eatwell Guide' would take up 42% of disposable income after housing costs. As outlined in Chapter 2 (Literature Review), fruit and vegetable consumption is well below recommendations and has shown little sign of increase. Fruit and vegetables and low-income consumers seem to be the relative 'losers', so far, in the neoliberalised food system.

Moore (2010, p.390) considers "neoliberalism as a distinctive phase of capitalism premised on taking first, and making second. This is the 'Robin Hood in reverse' character of neoliberalism – stealing from the poor and giving to the rich". Another cited feature of neoliberalisation has been the penetration of finance into everyday life. As Rossman (2007, p.5) suggests, "food companies, for example, are no longer simply competing in yoghurt, or carbonated drinks or processed meats. They are competing on financial markets to deliver the fastest and biggest possible rates of return to 'impatient' financial capital." If nothing were to change, there is no reason to suppose that fruit and vegetable consumption would increase. It is widely acknowledged that intervention of some kind is needed in the system to push it to

deliver broader sustainability outputs including improved diets. Haddad *et al.* (2016, p.29) contend “If they (food systems) are not explicitly designed to improve health, there are few guarantees that they will do so.”

As outlined in Chapter 2 (Literature Review), the ‘crisis’ of the neoliberalised food system has evoked different stakeholders to adopt different approaches to try and solve it. ‘Mainstream’ food system actors have tended to see change in terms of adapting current neoliberalised systems, and ‘alternative’ food system actors have tended to problematise the ‘mainstream’ food system and offer solutions in opposition to it. In general however, the ‘alternative’ food system, although suggesting numerous practices, has not come up with another overarching replacement system. Moreover, Moragues-Faus and Marsden (2017, p.277) suggest that:

> “scholars have exposed how in many cases these ‘ethical’ and ‘sustainable’ initiatives can conceal potential environmental impacts and reproduce social inequalities, and might also be fostering an infertile consumer politics by deepening individualist practices and reproducing neoliberal configurations that hinder social change”.

Marsden and Morley (2014, p.215) also note that ‘alternative’ food network scholarship has “largely failed to address questions of potential convergence and scaling out, or the extent to which these alternatives provide a real basis for progressive political contestation and development or sustained post-neoliberalised and post-carbonised transition”. Whilst this is the case, Tulloch and Neilson (2014, p.26) suggest “then the possibility of widespread dissemination of an alternative discursive formation is also highly unlikely.”

Without viable models for ‘alternative’ world systems and in the interests of pragmatism and trying to change the situation as it is, the research for this thesis and Peas Please adopted a ‘reform’ rather than ‘revolution’ approach. It did not offer a radical re-think of world economic systems but asked if the current system can improve outcomes. It took the ‘crisis’ situation of the food system as outlined in Chapter 2 (Literature Review), and tried to establish, in terms of increasing fruit and vegetable consumption, if the system as it is can deliver greater sustainability and security benefits for the population.

Convergent approaches have been a gap in practical food system work until recently when city food regions began working with multiple stakeholders to develop more sustainable food systems at a city region level. The national work of Peas Please to some extent is a pilot for convergent food system planning for a public good at a national level. Peas Please does not problematise making money from food, it problematises the type of food that money is made from. It does not problematise processes but outcomes, and asks how the neoliberalised systems can be modified for better public health through increased vegetable consumption.

There are various suggestions as to what to call the attempts to upgrade the neoliberal model in order to deliver broader environmental and social sustainability. The terms ‘post-neoliberalisation’, ‘inclusive neoliberalism’ and ‘not quite neoliberal’ have been suggested and are discussed in a little more detail here. The ‘post-neoliberalisation’ literature mainly emerged from Latin America where, following a period of intense neoliberalisation during the 1970s to 1980s associated with many negative environmental and social impacts, a wave of counter movements swept the area from the 1990s (de Freitas, Marston and Bakker, 2015). Since 2000, the social movements have been reflected in the election of over twelve left-leaning governments in the area who variously adopt anti-neoliberal stances. This has included attempts to ‘socialise’ economies through processes such as welfare reform and participatory decision-making (Yates and Bakker, 2014). The term ‘post-neoliberalisation’ has been used to describe this shift in Latin America away from the neoliberalisation that came before it. However there is great variability in policy and action in the region and some question to what extent it could be said that the activities are ‘post-neoliberal’ rather than just a different strand of neoliberalisation or a more ‘inclusive neoliberalism’ (Burdick, Oxhorn and Roberts, 2009). De Freitas, Marston and Bakker (2015) use the term ‘not quite neoliberal’ in preference to ‘post-neoliberal’ to encapsulate the heterogeneity and ambiguity around the term. The term ‘not quite neoliberal’ helps describe where Peas Please sits in relation to neoliberalisation debates.

The advantages and disadvantages and potential impact of this approach are explored in detail later in this chapter. However, whether it is possible for neoliberalised systems to deliver broader equity and sustainability at all is much debated. In the case of Latin America, despite decades of ‘post-neoliberalisation’ in

the economies based on resource extraction such as in Venezuela and Bolivia, there has been no change to the main economic model, and resource extraction has actually increased not decreased over that time (de Freitas, Marston and Bakker, 2015). Tulloch and Neilson (2014, p.35) note that “not only does capitalism imply the respective destruction of society independently of a compounding ecological effect, but in the contemporary era, the restabilisation of capitalism as a viable growth model depends on the escalating destruction of the planet that is already ecologically over-reached” (Neilson, 2013). Whether, Peas Please, by working within the neoliberal structures (in terms of increasing the amount of products sold, albeit healthy) actually reinforces the neoliberal paradigm which in turn increases inequality, thus undermining what it is trying to achieve is as yet unknown. Ambler-Edwards *et al*. (2009, p.5) share this concern when they say “it is currently unclear whether the sectors can easily reconcile traditional commercial imperatives with the wider public interest and move from its ingrained short-termism in order to develop the more strategic focus required.”

At present the majority of the population and particularly those on lower incomes are now dependent on the ‘mainstream’ food system to create their food environment. As described in Chapter 4 (Requirement), current production of the ‘alternative’ food system, at least in terms of fruit and vegetables, is very low and needs considerable expansion in order to start delivering the kind of volume which will contribute meaningfully to population requirement. If the inequality of dietary consumption is going to be addressed in the near future, it is going to have to be done by ‘mainstream’ as well as ‘alternative’ producers; who, by their own admission, for a variety of reasons as outlined in Chapter 5 (Barriers and Enablers), tend to sell to the more affluent at present. Many academics (Kirwan and Maye, 2013, Blay-Palmer *et al.*, 2013, Goodman, 2004, Marsden, 2012) have written about the need to look at convergence and how local food systems can be co-ordinated with national and international food systems; rather than envisaging the two systems as being mutually exclusive and oppositional. The convergent approach adopted in this thesis is also suggested by Jennings (2015) in relation to city food system policy development, who acknowledges that the idea is “starting to gain traction, but remains a relatively new concept.” According to Jennings (2015, p.67):

> "The city region food system concept poses the challenge of moving towards new food systems that exemplify the best characteristics of both Food System 1.0 and Food System 2.0. In other words: Food System 3.0. This is not a singular model for food system functions and processes, but an approach to change. It does not imply 'creating' a new food system from the ground up, but rather working with the multiple and highly context-dependent food systems that currently exist in different settings in order to purposefully and democratically engage with them and shift them towards better outcomes."

Food system 1.0 is characterised by regional production and a greater prevalence of small-scale producers, and food system 2.0 with increased national and international food production and a smaller number of actors at all stages in the supply chain; food system 3.0 is a combination:

> "If the world seems to be moving further towards a Food System 2.0 scenario, with both the benefits and drawbacks that this brings, the city region food systems approach might represent a step towards creating 'Food System 3.0': where food is recognised as a multifunctional nexus bringing together landscapes and human well-being, where enterprise flourishes, and where linkages become critical tools for delivering beneficial outcomes." (Jennings *et al.*, 2015, p.37)

Food system '3.0' is analogous to the convergent path being explored by this thesis and Peas Please, though on a national rather than a regional level. Dubbeling, Carey and Hochberg (2016, p.30) referring to Jennings (2015) note that "although a food system 3.0 recognises a potential central role of the private sector, it also understands that public goods will not be delivered by market forces alone and that greater transparency and public participation in the food system are required". They also note that there needs to be "conscious and knowledge-based policy to foster a resilient balance of food supply from global and local sources, which is based on an awareness of the multiple food system outcomes for health, economic development and environmental sustainability" (Dubbeling, Carey and Hochberg, 2016, p.107).

This thesis contributes to literature around 'not quite neoliberal' UK futures in relation to food security and sustainability. That is to say, the research for this thesis asks whether is it possible for neoliberalised systems to move beyond economism and adapt to deliver more public goods, like increased fruit and vegetable consumption. Whatever form it might take, work to improve modern food system outcomes is likely to have to engage with the complexity of the food system, multiple stakeholders all with varying amounts of power to effect change, various scales and differences in opinion as to how food systems should be adapted.

7.3 Divergence, convergence and ‘spaces of possibility’

This thesis began by problematising the division between ‘mainstream’ and ‘alternative’ actors in the food system and asking whether healthier and more sustainable diets might be better achieved if multiple stakeholders came together to problem-solve; whether there may be benefits to convergence. Chapter 2 (Literature Review) showed that there are underlying theoretical differences in approach between those in the ‘mainstream’ who tend to follow the food security narrative, which is linked to neo-productionism, and those who suggest that a new ‘alternative’ food system is needed based on food sovereignty, the right to food, the livelihood approach, community food security, and sustainable diets.

The research for this thesis, supports the view of convergence theorists that there is divergence in the food system, but that it is more complicated and widespread than an over simplified dichotomy between ‘alternative’ and ‘mainstream’. To begin with, stakeholders from ‘alternative’ and ‘mainstream’ had more in common than the terms suggest. As well as sharing a basic belief that everybody should have enough of the right food to eat, both tended to believe that it is individual consumers within the food system who have to drive systemic change, positioning them both within a neo-productionist, individualistic or ‘neoliberal’ framing of food security. For ‘alternative’ food system stakeholders this was shown by advocating for more active citizenship, gardening, cookery and volunteering. For ‘mainstream’ stakeholders this was shown by references to the need for consumers to drive demand. For both, the idea that the whole food system needs to drive change was a relatively new concept (although perhaps the ‘alternative’ food system had gone further down the route of imaging systemic change). The problematisation of the individualisation of the food security narrative, by the researcher and by Peas Please therefore seemed to chime with stakeholders on both sides; and the move towards the idea that whole food systems need to deliver change acted to facilitate convergence, as a range of stakeholders from across the food system were able to agree. The food systems approach here was seemingly apolitical and yet political. Apolitical in that it appeared not to attach itself to a political stance, and therefore stakeholders of different perspectives could come together to problem solve, but political in that the problem was reframed from

being a problem of consumers to being a systemic problem. This effectively moved the food system approach into the ‘not quite neoliberal’ arena.

The divergences within the food system were much more widespread than the researcher originally envisaged. For example: between stakeholders within the same sector, between theorists, between theorists and practitioners, between producers, between producers and retailers, between nations, between different parts of the supply chain, between researchers and practitioners; and between government departments, for example food production and health. To some extent, this is not a surprising finding. The divergence in the food sector is a reflection of divergence in human social and cultural interactions in general. Rosling *et al*. (2018, p.21) suggest, after reflection on decades of trying to educate, test and listen to the way people misinterpret facts about population health, that humans have an “irresistible temptation to divide … things into two distinct and often conflicting groups with an imagined gap”. But they contend that, on closer analysis, the reality is often not as polarised, and that often “the majority is … in the middle, where the gap is supposed to be” (Rosling *et al*, 2018, p.46). Although this may be a simplification, it resonated with the findings of this research.

In terms of the food system, it is argued that divergence may have been holding back positive change for better and more sustainable diets. As discussed in Chapter 2 (Literature Review), there were no plans at a system or state level for how the UK nations will move towards better and more sustainable diets. In terms of fruit and vegetable consumption, before the research for this thesis began, there were no published details on population fruit and vegetable requirements, whether there are enough fruit and vegetables for the UK to meet the requirements and what to do to get to that point. There was also no one ‘place’ where stakeholders from all parts of the food system coalesced to discuss how to make progress on meeting population requirements. Fruit and vegetable producers with differing production methods and views of sustainability, were also divided; and this inhibited their ability to come together, plan, and lobby for support. The ‘public health platform’ in the form of the fruit and vegetable requirement in the first instance, and then increasing population vegetable consumption as part of Peas Please in the second, offered a ‘space of possibility’ where multi-stakeholder convergence and discussion became possible at a UK level.

The population fruit and vegetable requirement figures were adopted and used across ‘divides’ by ‘mainstream’ and ‘alternative’ stakeholders and by stakeholders with different politics. This is perhaps exemplified by ‘City Farms’ who represent community growing initiatives across Wales and the Countryside Land and Business Association (CLA) who represent large-scale landowners, both independently using the ‘only 2 % of land to provide ‘5 a day’’ statistic to lobby Welsh Government to develop horticulture in Wales. Also, by Assembly Members from Labour and Conservative parties both asking the Welsh Government what they intended to do to make up the ‘deficit’ in fruit and vegetable availability in Wales.

The population fruit and vegetable requirement was therefore a tool for exploring convergence, because it was relevant and could be supported by a variety of stakeholders. The ‘public health platform’ in the case of increased fruit and vegetable consumption offered a ‘space of possibility’ in which stakeholders with different conceptions of the solutions to better quality diets and sustainability could gather to discuss. It also helped to show how actors within the food system were related, their ‘relationality’ which potentially increased empathy. This was shown in the Sustainable Food Cardiff workshop where large-scale and small-scale producers, as well as academics, council, retailers, came together to discuss Cardiff’s fruit and vegetable requirement and how to increase production and consumption. The large-scale producer recognised that the small-scale production sector has much to offer in terms of education and community engagement and the small-scale producers acknowledged that the large scale had a lot to offer in terms of volume and reach. The Wales Vegetable Summit also showed how a systemic approach had the potential to bring multiple stakeholders together with representation from Government, Council, Health Boards, wholesalers, processors, large-scale businesses, small-scale businesses and producers, all of whom made commitments to action on increasing vegetable availability. The requirement findings of a deficit and a need to increase production and consumption also helped producers from ‘mainstream’ and ‘alternative’ paradigms to come together in a ‘Fruit and Vegetable Alliance’. Here again the large-scale producers recognised that the small scale has a lot to offer in terms of offering opportunities for new entrants and education, and small-scale producers recognised the volume capabilities of large-scale growers. There was also a recognition that collective action was beneficial.

As outlined in Chapter 2 (Literature Review) the current UK and Welsh Government, along with large-scale business, associate with the neo-productionist food security narrative and so they often frame solutions in those terms, although the Welsh Government may perhaps have to revisit this in light of the Well-being of Future Generations Act (Welsh Government, 2015b). Some activists, NGOs and academics who openly oppose 'neoliberalism' often associate with the 'alternative' food system narrative and often frame solutions in those terms. These groups have more barriers to being able to host multi-stakeholder, convergent spaces. Peas Please highlighted a desired outcome, for increased vegetable consumption, and then called for collective action, hence inviting stakeholders to contribute in a 'safe space'. It brought people together because it problematised the outcome of the present food system whilst being flexible on the process required to change that outcome. Some researchers who have looked at multidisciplinary working in relation to city level food policy have emphasised that "it is important that those who take the initiative have a good capacity to establish linkages with a variety of stakeholders" (de Zeeuw and Dubbeling, 2015, p.62). This thesis argues that this element is key to success and may be done by any stakeholder from business, government or civil society. Civil Society Organisations such as Peas Please, are in a good position to create more neutral spaces for multidisciplinary discussion; provided that they are working for a specific public good, in a 'space of possibility', and that they have an understanding of the dynamics at play and a commitment to equality and sustainability.

The Peas Please project board comprised a core group of CSOs working more broadly for greater fairness in the food system, better food security for all and greater environmental sustainability. More specifically, the Food Foundation tends to campaign on food system change for better public health for all; the WWF-UK on environmental degradation and need for greater environmental sustainability; Nourish Scotland on trying to redress the power imbalances within the food system to deliver greater sustainability; and Food Cardiff on practical steps for greater sustainability in terms of environment, society and economy. As such, the project board had a core understanding of the injustices and power imbalances within the food system and the unequal distribution of benefit within society, as well as the negative environmental externalities. They used this to help maintain and enhance the convergent space in the interest of the public good.

Convergence is not easy. The research for this thesis found that convergent spaces are hard to maintain. The food system is not a benign list of supply chain processes and actors that can be influenced in a straightforward way. It is a complex and contested space which has to be negotiated through human stakeholders in positions of influence on many scales. This has also been noted by others; for example de Zeeuw and Dubbeling (2015, p.60) who comment that “those who manage the multi-stakeholder planning process should be aware of the differences in policy influencing and market power of the various stakeholders in the food system, detect potential conflict areas and have the ability to manage (potential) conflicts”. This was exemplified by the near ‘day two walk-out’ at the initial Vegetable Retreat in Birmingham and highlights two potential drawbacks of the convergent approach: that those with more power might have more influence, and that wider sustainability aspects can be sidelined. Academics, in relation to food security, have written of the danger of multi-disciplinary spaces. McKeon’s (2017) paper, “Are equity and sustainability a likely outcome when foxes and chickens share the same coop?”, talks of the difficulty of level playing fields and sustainability being achieved when ‘big business’ hosts multi-disciplinary spaces.

In the case of Peas Please, ‘big business’ was not hosting the space; but nevertheless the potential greater power to influence was clear. In the case of the Vegetable Retreat it appeared that prescribing sustainable practices in the scene setting document Veg Facts was divisive. Environmental sustainability is divergent in that different stakeholders have different perceptions about what it involves. For example large-scale producers often couch it in terms of resource efficiency, energy generation from renewable resources and land sparing; whereas smaller scale producers or those from the ‘alternative’ food system often refer to it in terms of land sharing, biodiversity and environmental service enhancement. The large-scale producer bodies felt unable to sign up to the sustainability practices which Veg Facts was outlining as they were perhaps couched in ‘alternative’ food system terms. Prescribing a set of sustainability practices excluded those who agreed with the intended outcome but who had different ideas on sustainability practices. Some might argue that this was big business using their power to undermine attempts to improve environmental sustainability. The Peas Please project board faced a dilemma: if it was to remain convergent, the ‘public health platform’ could not also be

used to drive environmental sustainability in this instance. A decision was made to remove most of the sustainable production section from the Veg Facts document and, as quoted by van den Berg (2017, p.18) from Nourish Scotland, to "'fight this battle some other time, some other place'".

This may mean that there is a role both for those who make environmental sustainability explicitly an outcome, and for those who do not. In Peas Please, environmental sustainability became implicit at this point. For some this is a problem. As one 'alternative' food system stakeholder commented: "but what you are doing could result in fields upon fields of chemical carrots." By not establishing environmental sustainability as core to delivering change, could the drive for increasing vegetable consumption result in negative externalities for the environment? It could be argued that there are other, better, mechanisms in place for driving environmental sustainability within farming, for example LEAF (Linking Environment and Farming), various organic certification schemes, and perhaps future agriculture subsidies for environmental services. But it remains a concern that unsustainable practices could be facilitated through Peas Please not only at the production side but also on the processing and packaging side. The key concern for Peas Please is that people move to consuming more nutritious foods like vegetables, and this is considered a mission enough in itself. Packaging and waste are important issues and there are dedicated initiatives looking at this such as WRAP (Waste Recycling and Packaging). Other initiatives like the Soil Association's 'Food For Life' programme (Food For Life, 2018) do manage to combine environmental sustainability and health with success, but their reach has perhaps been limited. Given the complexity and divisiveness of sustainability and the scope of the challenge of changing population diets, concentrating on a single issue was a practical compromise in the case of Peas Please. Getting more vegetables eaten in the first place remains its primary mission. As the initiative progresses it is likely that broader sustainability issues will have to be revisited.

Power imbalance is a problem within the food system and has to be managed carefully. The initial marginalisation of the Landworkers' Alliance (a food sovereignty and agro-ecological producer organisation) by large industrial scale horticulture producer bodies from a potential Defra Fruit and Vegetable Roundtable highlighted this. The development of the roundtable had been left to large-scale industry. After a

year the roundtable had not materialised; perhaps because the large-scale producer bodies involved felt they already had the ear of the government and they did not need to expand the representation and potentially dilute influence. At this stage, Peas Please, with a more 'neutral' platform in its desire for increased fruit and vegetable production and consumption in the UK, could bridge the gap. It suggested that the SME Horticulture Group, including organic and agro-ecological growers, which Peas Please had been involved in supporting, could form the basis of a new Defra Edible Horticulture Roundtable, effectively circumventing the large-scale producer bodies who had been holding back progress. The large-scale producer bodies could then be invited to join. This is effectively what happened with the formation of a Fruit and Vegetable Alliance linked to a Defra Edible Horticulture Roundtable with a variety of producer support organisations alongside Peas Please. This involved navigating the power dynamics in order to ensure greater diversity of engagement and opinion and that a diverse view of sustainability had a voice at a governmental level. Power comes in many forms and this showed that there can be power in numbers as well as scale. By helping to provide a more neutral public health platform Peas Please was able to support a broad range of sustainable production stakeholders to gain greater links with government, thus potentially increasing sustainable production in an implicit rather than explicit way. In effect, to continue with the fox and chicken coop analogy, Peas Pleas's role was to ensure that only foxes who were prepared to eat vegetables were allowed in with the chickens, and the chickens were only allowed to eat vegetables too. The role of Peas Please was to ensure that those involved were adhering to the public good cause of trying to increase vegetable consumption and to work with other partners to deliver other aspects of sustainability.

Although this thesis argues that convergent or multidisciplinary spaces are potentially important in bringing about change for better food systems, it does not argue that there should be no 'divergent' or single disciplinary spaces. Single disciplinary spaces may be important to build strength within sectors of the food system. To use the analogy in the introduction, there is a need for the Oxford Real Farming Conference and the Oxford Farming Conference as well as a convergent platform where both can contribute to what needs to be done for greater food security and sustainability. In terms of the PAR for this research, it was recommended in Chapter

5 (Barriers and Enablers) that a number of strengthening networks be established, a ‘Growers of Wales Network’, a ‘SME Horticulture Group’ and a ‘Fruit and Vegetable Alliance’, with small-scale and large-scale producers combined. It is important that different perspectives are not diluted by multi-stakeholder platforms and maintaining support systems for ‘communities of interest’, that is to say stakeholders with similar needs, helps add strength and co-ordination for voices that may otherwise be ‘lost’. In the case of the SME Horticulture Group, it was important for the group to continue to exist, regardless of the establishment of the Fruit and Vegetable Alliance and the Defra Edible Horticulture Roundtable. This enabled detailed discussion of the issues pertinent to the SME sector. It is likely that the large-scale producers were also engaged in similar discussions.

It is hard to tell whether or not engaging multiple stakeholders in designing food system change benefitted the process, as that was not explored. There certainly appeared to be benefits to the approach in terms of democratic planning, problem solving around complicated issues and stimulating action across a variety of sectors and food system actors. The research for this thesis found that, where there is some attempt at convergence, multiple stakeholder spaces are useful. Other researchers have argued along similar lines. In their review of multi-stakeholder planning of the urban ‘agro-food system’, a phrase they prefer to ‘food system’, de Zeeuw and Dubbeling (2015, p.60) argue that “it is important to keep both ‘mainstream’ actors, ‘informal’ and ‘alternative’ food chain actors involved in the planning process.” According to MacRae and Donahue (2013), food policy councils and other city region planning initiatives in Canada have had a low representation of ‘mainstream’ food actors and this may have resulted in low impact. De Zeeuw and Dubbeling (2015, p.58) suggest some advantages and disadvantages to the multi-stakeholder approach. Advantages, they argue, include more participatory governance, better situation analysis and decision making, enhanced likelihood of implementation success, and improved problem solving and innovation capacity. Disadvantages, they argue, are that it takes more time, adds complexity to the planning process, and in some cases may not lead to satisfactory results due to this complexity. The research for this thesis would tend to agree with the advantages and disadvantages outlined by de Zeeuw and Dubbeling (2015). Managing this complexity was a major part of the work of Peas Please and, this thesis argues, integral to the progress and

commitments it achieved in a short time. What it might take to try to navigate this complexity is summarised in Chapter 8 (Conclusion).

7.4 Linking production and consumption

Chapter 2 (Literature Review) suggested a problematic division between production and consumption and that combining these offered a useful starting point to look at the possibilities of convergence. In order to facilitate this, the research focussed on one food group, fruit and vegetables, and asked if there were to be planning for the health of the nation, in Wales and the UK, how much fruit and vegetables would be required? This meant effectively bridging the gap between public health nutrition and agri-food research: the first convergence exercise of the research. The population fruit and vegetable requirement figures offered an original contribution to knowledge. That these calculations had not already been done at a governmental level is a reflection of the neo-productivist view of food security: that food security is best delivered through the market and consumer choice. To some extent, post 2007, governments have been forced to recognise that the food system as it stands has not delivered healthy diets and that it needs to change. The question is how to make this happen.

The population fruit and vegetable requirement was modelled by scaling up government public health guidance. This was based on the premise that if the Government is going to have public health recommendations it should consider the implications of these at a population level. This is a ‘not quite neoliberal’ approach. Some might argue that dietary guidance changes to such a degree that it should not be used as a basis for projections. However, when it comes to fruit and vegetable consumption recommendations, the message has been consistent for decades that people need to eat more of them. That the guidance changed from ‘5 a day’ to ‘7 a day’ (PHE, 2016b) part way through the research for this thesis changed the calculations but did not change the overall implications. The original projections highlighted that public health recommendations have major implications for the food system and production needs. That the requirement increased showed greater need to increase production and consumption and engage with food system stakeholders when introducing new recommendations. In Wales there is perhaps more reason for

the Government to model their public health recommendations, given the introduction of the Well-being of Future Generations Act (Welsh Government, 2015b).

The fruit and vegetable requirement is a potentially useful planning and modelling tool for government. In the case of Wales, it showed that very little of the requirement is presently grown in Wales, 0.1% of the land growing just under 3% of the population's '7 a day' requirement. Whether this matters is open to debate but given insufficient consumption it highlights the question of how the deficit could be made up at a systemic level. This either involves increasing production or importing more or both. This range of solutions allows modelling of potential production scenarios and a basic attempt at doing this was done in Chapter 4 (Requirement). It enabled the presentation of scenarios for potential future production. Linking production to consumption provides clear insights to help plan for a more secure and sustainable food system. More detailed modelling, based on population fruit and vegetable requirement, is recommended.

For the UK the fruit and vegetable requirement figures showed that there was a deficit in availability. If everybody in the UK were to be inspired or able to take up the Government's recommendations there would not be enough fruit and vegetables available (including imported and home produced). Some might argue that this is because availability is just a reflection of demand. But production, in this country or in others, takes time and investment in order to ensure supply, so some degree of forward planning is necessary. The likelihood is that a mixture of increasing UK production along with increasing imports will be needed in order to meet consumption requirements. The fruit and vegetable requirement data therefore provides a message to government that there is a need for increasing fruit and vegetable availability at a system level, which could involve expansion of the production of fruit and vegetables in the UK or abroad or both.

There are a number of drawbacks to the fruit and vegetable requirement. The nature of the requirement calculations being based on changing public health requirements and populations mean that they need updating periodically as the underlying variables change and this has to be made clear in their dissemination. Consumption and production statistics do change and are reported on periodically. It is recommended that Defra report annually on the UK population fruit and vegetable

requirement as part of their horticulture statistics, comparing availability to requirement, in addition to financial data.

Although this thesis talks of combining production and consumption, what it is actually talking about is combining public health recommendations and production. This was because the research was trying to move stakeholders away from the individualisation of the food security narrative and it was thought that concentrating on individual consumer needs would confuse the matter. Concentrating on population level statistics helped highlight that doing so provides useful food system governance insights around population health requirements. Having highlighted this, more work with people as consumers, for instance exploring their experiences of the food system would be recommended; and this question is discussed later in the chapter in relation to Peas Please.

The fruit and vegetable requirement is not based on economics. It is a requirement for health, and this is a problem for some business stakeholders who may be more interested to know about market demand. This may have been an issue for the credibility of the fruit and vegetable requirement calculations with business but highlights the challenges of working with businesses to deliver public goods alongside income generation. The implicit suggestion behind presenting the requirement to stakeholders in the supply chain was that they have a role to play in shaping demand as well as reacting to demand and though some businesses understood this, others found it more challenging. Some of those that did engage significantly in Peas Please, in the form of committing to comprehensive Veg Pledges, for example PwC and BaxterStorey[29], found that there was a business case for increasing availability and sales of vegetables. In BaxterStorey's case this related to attracting customers to stay within in-house catering facilities, thus increasing meal purchases.

The fruit and vegetable requirement suggested potential futures but did not offer potential solutions. This was a strength and a weakness. It was a strength in that it offered stakeholders an open book to suggest how to increase consumption. However, it was a weakness when not enough parts of the food system were involved, for example when only looking at production and consumption. When

[29] Aimed to increase the percentage of fruit and vegetables in their restaurant from 16 to 20% by 2018.

engaging producers in discussion on the Wales population fruit and vegetable requirement there was general agreement from small-scale and large-scale on barriers and that increasing production would be possible given the right support. The majority of fruit and vegetable producers at the time of interviews and workshops found the requirement information 'interesting but of no use', though it was subsequently used to launch the UK Fruit and Vegetable Alliance. But both large and small-scale argued that increasing consumption could not be done without consumers eating more fruit and vegetables and without the supply chain adjusting. They were clear that this was not something the fruit and vegetable sector could do alone. The sector was stuck in a situation where it could increase production if consumption increased but without ways of increasing consumption, production could not be increased. In terms of Wales there was also a particular problem in that supply chain influencers such as supermarkets mainly had head offices in England, which further inhibited the ability to effect change without moving beyond the Wales scale. In effect, the process of engaging with people on how to increase production and consumption of fruit and vegetables in Wales revealed a divergent food system without much interaction between the different elements and different scales; which served to encourage excuse making and disincentivise change. Combining production and consumption was perhaps not convergent enough in that it only looked at two aspects of the food system, whereas greater convergence was needed in order to try and facilitate change:

> "This means thinking well beyond agriculture to also consider the many processes and activities involved in food production, processing, storage, transportation, trade, transformation and retailing. This amounts to a change in mindset, and a fundamental shift in approach." (Haddad *et al*., 2016, p.17)

Linking production and consumption was a useful starting point for this research. Combining public health nutrition with agri-food research provided some useful insights around population fruit and vegetable requirements, potential land needs for production, scenarios for future production, and policy suggestions. The fruit and vegetable requirement moved food security from a life sciences individualistic framing to an ecological public health framing, thereby shifting the finger of blame from consumers and turning it to a systemic challenge. In itself however, it was unlikely to deliver the scale needed for systemic change; for this it seemed necessary to engage with the whole of the supply chain.

7.5 A food system approach

The limits of the narrow focus on consumption requirements and production led the researcher, through PAR, to engage with other stakeholders in the development of Peas Please, an initiative which aimed to involve the whole of the UK food supply system in increasing vegetable consumption. Section 7.5.1 provides a recap of Chapter 6 (Peas Please). It then suggests the main aspects of the approach which led to the progress of the initiative. Section 7.5.2 goes on to look at whether the approach has led, or is likely to lead to, increased vegetable consumption or social transformation. Finally, section 7.5.3 compares the Peas Please approach to other food system change approaches.

7.5.1 The Peas Please approach

Peas Please adopted a pragmatic food system approach to increasing consumption of vegetables. In summary the significant activities of its set-up phase were:

1. Define the ‘space of possibility’
2. Examine the fact base
3. Build relationships across the food system and with government
4. Identify potential levers for change
5. Co-create simultaneous multi-sector action framework
6. Facilitate key engagement events
7. Plug gaps in current activity
8. Develop and deliver monitoring and evaluation
9. Reflect and feed back to action framework and development and make links to policy.

These activities are part of an ongoing iterative cycle. There is no one food system approach to achieving better food security and sustainability, as this is an emerging area for policy intervention and action. This thesis adds to the research in this area.

This section builds on Chapter 6 (Pease Please) and complements the interview based analysis by van den Berg (2017, p.i) on the “methods adopted by the Food

Foundation in the Peas Please project". Ten key aspects thought to contribute to the progress of the initiative to date are summarised in Figure 60 and outlined in more detail in this section:

	Key aspects of the Peas Please food system approach
1	Working in a 'space of possibility'
2	Representing a public good
3	Identifying potential levers for change
4	Working with people as key facilitators of change
5	Simultaneous engagement
6	Co-production
7	Using established networks
8	Continually integrating and reflecting on research
9	Plugging gaps in activity
10	Being fun and positive

Figure 60. Ten key aspects thought to contribute to the progress of Peas Please to date.

The main strength of the Peas Please food system approach is that it is working in a 'space of possibility' akin to Sustainable Food Cities where the city is the 'space of possibility'. In the case of Peas Please, increased vegetable consumption and production at a national level are the defining characteristics of the convergent space. This gives it the capacity to bring a diverse group of stakeholders together. This is discussed in more detail elsewhere in this chapter.

In common with van den Berg (2017) the research for this thesis found that building relationships was an important aspect of the work. Concentrating on stakeholders as potential facilitators of change within the system was key to the approach. Many of the pledges were 'landed' because a person within a business or organisation understood what Peas Please was trying to achieve and wanted their business to partake. Where a key person did not exist it was very difficult to make progress. The involvement of the researcher on the Peas Please project board is a case in point. How was it that a lone researcher from Wales came to be helping to run a national initiative? It was partly to do with people enthusiastic to the cause being seen as a key resource to facilitate change within the system. Because the approach involved working with people as facilitators of change within the system, social events were a key tool. They were used in many cases to incentivise action. Having deadlines and a sense of urgency for the summits of 2017 and 2018 were motivational incentives and helped to speed up the decision making process within businesses and organisations and commit stakeholders to action. Placing relationships as integral to systemic change is also suggested by Vize (2016, p.10) in relation to transforming systems more generally:

> "The progress of many projects has been helped by the emergence of people who see the importance of relationships in building foundations for success, and are prepared to put time and effort into making them work."

The commitments framework was co-designed with a diverse range of stakeholders to encompass a wide range of possible actions from across the food system. It made use of already established networks as much as possible in order to maximise potential reach as discussed in a previous section. Peas Please is providing an example the sort of governance structure which many have been calling for in relation to food system change. Ambler-Edwards *et al.* (2009, p.6) in their Chatham House report 'Food Futures' noted that "the establishment of a consortium of government, supply network interests and societal groups (media, NGOs, universities) would be a good first step to facilitate the building of this vision." In their report on the trends and challenges in the future of food and agriculture the FAO (2017, p.41) suggest that "policies should be coherent, as development is complex and should involve all actors and sectors" and Haddad *et al.* (2016, p.19) remark that "this will require stakeholders from governments, civil society, the media, business

and research to work together to make improving dietary quality a sustained political priority" and that "policy makers and other key decision makers need to work throughout the food system to effect diet change" (Haddad *et al*., 2016, p.20).

Perhaps what is not made clear by the list of Peas Please activities above are the benefits of simultaneous engagement across the food system. Peas Please potentially facilitated greater engagement because there was a simultaneous 'call to arms'. The lack of allocation of blame and suggestion that all sectors have their part to play simultaneously in driving up consumption breaks the cycle of blame which results in inaction: it's the consumers' fault for not eating more; it's the supermarkets' fault for not supplying more; it's the Government's fault for not supporting more; it's the producers' fault for not making more available. As suggested in Chapter 5 (Barriers and Enablers), producers may be stuck in a 'chicken and egg' situation where they cannot increase production because there is insufficient consumption, but in order to enable greater consumption they need to produce more and for that produce to be consumed. By simultaneously engaging with increasing consumption and production, producers felt more confident, along with reassurance from the Government that it would support the development of edible horticulture, to commit to increasing production through the Fruit and Vegetable Alliance. As Haddad *et al.* (2016, p.116) suggest, "with so much at stake, we all share a responsibility to find solutions that work for everyone." In the case of Peas Please this ethos was central but unarticulated and helped to deliver a range of Veg Pledges.

The main role of Peas Please was to represent the public good, or 'value to nutrition', and to ensure that activities were co-ordinated and in the interest of that nutrition outcome. When engaging with business, the job of Peas Please was to test how far each business stakeholder was prepared to go towards increasing the relative availability of vegetables. Peas Please was fulfilling the advocacy role for vegetables and businesses would weigh up what they could do whilst still maintaining profits. How far each business or organisation was prepared to go differed. Where pledges were unambitious, Peas Please tried to push pledgers further and where they were ambitious tried to support and recognise and publicise good practice. Pledgers were also encouraged to improve the strength of their pledges at the 2018 summit.

Where there were obvious gaps Peas Please attempted to facilitate action; for example, the development of the Fruit and Vegetable Alliance and Veg Power. This indicated to stakeholders that as well as co-ordination the initiative was willing to 'do their bit' in action to attempt to drive change. This 'we are all in this together and everybody is doing their bit' attitude may have helped to propagate commitment from others, for example the wide contribution of funds to the Veg Power campaign.

Establishing a fact base in the form of Veg Facts proved useful for establishing the credibility of the initiative. As outlined by van den Berg (2017) this was an important aspect of the approach which is in common with other initiatives involved in running voluntary agreements such as Waste Recycling And Packaging's (WRAP's) 'Courtauld Agreement' on waste reduction and resource efficiency. Reassessing the evidence and providing new evidence where necessary was a continual process and helped maintain the ongoing credibility of the initiative.

Although the other aspects of the approach are important, a crucial element, which was often commented upon by business stakeholders, was that the initiative was fun and positive. There was a clear decision by the project board to concentrate on increasing consumption of healthy foods and to steer away from messages about decreasing consumption of unhealthy foods. Perhaps this could be seen as avoiding difficult issues and not addressing broader sustainability issues (a potential downside of the initiative as discussed earlier) but it was thought necessary in order to drive the scale of engagement needed. Many other initiatives, including WWF-UK, promote a need to decrease meat consumption, for instance; but Peas Please decided it would not adopt an 'eat more vegetables and less meat' perspective as it risked diluting the positive message.

Many of those who engaged with Peas Please commented that part of the reason they were still involved was that there was a positive social side. Although there is obviously a role for more serious engagement, the initiative continually tried to balance this with a 'little bit of fun' in order to maintain interest and help with the maintenance of relationships. This is where social events were crucial, not only for motivating commitments to change but in maintaining engagement and providing positive marketing for the pledgers. It remains to be seen how Peas Please manages to navigate its way as the formation years pass and the Peas Please pledges come

to be rigorously evaluated with potential for pledgers to be seen in a negative light. With reputations at stake Peas Please may take a more serious turn.

7.5.2 Increased vegetable consumption and social transformation?

Figure 61. Higgins cartoon relating to Peas Please in The Grocer, February 2018.

The cartoon in the Grocer magazine, in Figure 61 above, raises the question of whether Peas Please is enough to deliver systemic change for increased vegetable consumption. Firstly, in terms of current and possible reach and secondly in terms of whether it goes far enough in addressing system change for it to make a difference.

As outlined in Chapter 6 (Peas Please), in the first eight months of Peas Please, 41 pledges resulted in an additional 4.8 million portions of vegetables being purchased (Food Foundation, 2018b, p.5), and after waste this is likely be less. The retail sector metric of percentage weight of basket composed of vegetables did not change from the 7.2% baseline over the first eight months. All the extra portions were from other sources such as out of home or food manufacturing and are self-reported and therefore their reliability is more questionable. A total of 4.8 million portions is likely to contribute little to making up the vegetable consumption deficit which at present is around 37 billion portions more needed to meet the UK population's '7 a day' requirement. In effect, compared to the first eight months, to reach the public health target Peas Please would need to increase portions sold around *one thousand times*.

Although not all change has to happen through Peas Please, there is obviously a need to upscale the reach of the pledges and to look at all levers possible to deliver the scale of change needed, and this is recognised by the project board (Food Foundation, 2018b). Seventeen new pledges were announced at the 2018 Vegetable Summit in London, including pledges from the supermarket retailers Aldi, Asda and Waitrose.

The timescale of the initiative is likely to need extending further. Initially the initiative was to run until 2020, but this has already been extended to 2022. It is unlikely that within the next four years the scale needed will be reached. Whether the Peas Please approach can deliver better dietary outcomes across the population of the UK is as yet unknown, but it will be monitored. In five to ten years' time there may be enough evidence to provide better analysis. WRAP's experience of negotiating Courtauld agreements on waste reduction may be insightful here in that the initial project ran from 2005–10, then was successively extended from 2010–12, 2012–15 and then 2015–2025 (WRAP, 2015b). Like Courtauld, it may be that 20 years is a more realistic timescale for Peas Please to make meaningful incremental changes to consumption.

There is however, the possibility that some other factor or actor, beyond what is currently conceivable, might create a tipping point for system change. Systems are dynamic and unpredictable and when they change they can change very quickly, for instance in the case of the rapid expansion of the internet in the 1990s (Urry, 2008). In terms of fruit and vegetables, the obvious example of rapid system change came during World War Two where the UK Government switched to importing protein and calorie rich food and supporting the production of fruit, vegetables, potatoes and cereals as part of what was known as the 'Digging for Victory' campaign (Collingham, 2011). War is obviously the last thing that would be desired to precipitate an increase fruit and vegetable consumption. But it cannot be ruled out that some other, as yet unconceived factor, such as a new social movement (which could be one of the activities of Peas Please) or technology, may create a tipping point that leads to sudden system change and increases in consumption.

Whilst impact from Peas Please in such a short time is perhaps not to be expected, there are a number of other factors that could be working against recent increases in

consumption including “challenging weather conditions in 2018, changes in the value of the pound and increased levels of business uncertainty due to the UK leaving the EU” (Food Foundation, 2018b). This section does not provide a detailed critique of voluntary agreements and the Peas Please pledges as this has been, and is being, commented on and monitored and evaluated elsewhere (Food Foundation, 2018b, van den Berg, 2017). However, this section does offer some reflections based on PAR and the literature.

In the first round of pledges some pledges were more far reaching than others and showed more promise. In general, the best pledges were specific, measurable and gave some consideration of maximising reach. This has also been noted in relation to other voluntary agreements, for instance Knai *et al.* (2015, p.1) who comment: “pledges or proposed actions need to be evidence-based, well-defined, and measurable, pushing actors to go beyond ‘business as usual’”. Three examples of better Peas Please pledges (for all pledges see Appendix 10) were BaxterStorey/PwC, Brains Brewery and Lidl-UK:

> “We pledge to increase the overall percentage of fruit and vegetables in the meals offered via BaxterStorey restaurants in PwC’s offices across the UK, from 16% to 20% by the end of 2018.” BaxterStorey/PwC
>
> “We pledge to increase the portions of veg in children’s meals from one portion to two, working to implement in 30–40 of our restaurants in year one.” Brains Brewery
>
> “We pledge to increase our range of fun sized veg to make it more appealing to children; to include one portion of veg (80g) in every ready meal or an equivalent serving suggestion on pack; to include two portions of veg in all our online recipes and to promote veg in store, online and on printed promotional materials.” Lidl-UK

Tesco’s pledge is an example of a pledge which is unlikely, in its present form, to deliver significant change, as it lacks specificity and breadth:

> “We pledge that when we develop our recipes and introduce new products we will aim to increase the amount of vegetables and ensure more vegetable options are included in evening meals deals. For example, our Finest evening Meal Deal will always include two vegetable side dish options. We will continue to work with our supplier partners to develop new vegetable-based products to increase the overall consumption of vegetables.” Tesco

This lack of specificity and breadth could lead to criticism of tokenism and ‘greenwashing’ or in the case of vegetables, ‘veg washing’. Tesco and other weak pledgers have been given the opportunity to improve their pledges by making them

more specific, measurable and expansive; and it would be advisable that they do so. As Peas Please goes forward there will be more rigorous reporting of the pledges and greater emphasis on highlighting those who do not show progress (Food Foundation, 2018b). This is based on the experience from other voluntary agreements. Bryden *et al.* (2013, p.186) comment that "some of the most effective voluntary agreements include substantial disincentives for non-participation and sanctions for non-compliance. Many countries are moving towards these more formal approaches to voluntary agreements." Other voluntary agreements have shown mixed success, notably the lack of effectiveness of the Public Health Responsibility Deal (Durand *et al.*, 2015) and the effectiveness of the UK salt reduction programme which reduced the population's salt intake by gradual reformulation on a voluntary basis (He, Brinsden and MacGregor, 2013). The findings of Bryden *et al.* (2013, p.186) again offer relevant insight: "For voluntary agreements to be successful, targets should be ambitious and clearly defined, with robust independent monitoring. Public knowledge of agreements can help encourage participation and ensure compliance."

At the same time as Peas Please is trying to increase vegetable product innovation and availability, other parts of the supply chain are also innovating and delivering new less healthy products to the market. This goes back to the neoliberalisation debate earlier in this chapter and raises a number of questions: is it possible for initiatives tweaking the neoliberal model to create meaningful change for better public health nutrition? Can neoliberalisation ever deliver healthy diets when so much more money can be made from unhealthy foods? And: how do we level the playing field? The answers to these questions are currently unclear. Concentrating on vegetables alone was beneficial for Peas Please in terms of focus, but like value chain analysis, it could be criticised for not addressing other parts of the diet. Peas Please is likely to be more effective if there are other initiatives and policies working to level the playing field for healthy diets. Peas Please does not exist in a vacuum; it is a branch of the work of the Food Foundation, Nourish Scotland, Food Cardiff and the WWF-UK, who are all engaged in wider work to improve food system outcomes around food security and sustainability. Other organisations and initiatives, such as Sustain, the Soil Association, Eating Better and the Food Ethics Council among others, are also working towards trying to redress the dietary imbalance.

There is a particular issue of how to facilitate greater consumption of vegetables amongst lower-income consumers. The Peas Please progress report notes that for those on lower incomes only 5.8% of the shopping basket on average consisted of vegetables in 2018; lower than the average 7.2%. This is reflective of the general trend noted in Chapter 2 (Literature Review) for lower-income consumers to not consume as many vegetables. Although there has been Peas Please work to try help those on low incomes, for example by facilitating good practice around expansion of the Healthy Start scheme (Food Foundation, 2018b) and by working with retailers whose customers may be on lower incomes, more work is recommended in this area. As Darmon and Drewnowski (2015, p.656) comment, "more research is needed to understand how some low-income individuals obtain higher-quality diets at no additional cost." Trying to address the needs of low-income consumers more comprehensively could be a particular focus for the next phase of Peas Please. Progress could be measured by the percentage of lower-income shopping baskets consisting of vegetables being brought closer to the average.

Peas Please has adopted a pragmatic approach to date, engaging with stakeholders who are prepared to engage. This has had its benefits in terms of building momentum, but a more strategic approach in order to target low-income consumers and to maximise reach and number of extra portions consumed is recommended for the next phase. In relation to voluntary agreements and pledges, Lloyd-Williams *et al.* (2014) ask whether the use of them amounts to a 'smorgasbord or symphony?'. At the moment, given the early stage of the initiative, the Peas Please pledges would probably be better described as a smorgasbord; but with more strategic work going forward and targeting of business, third sector and public bodies, it may turn into a symphony.

The first round of Peas Please pledges included pledges from 18 businesses, two universities, 14 CSOs, trade bodies or other organisations, and six public bodies including four councils. There were more pledges from the private and third sector than the public sector. Although there was much work behind the scenes to establish pledges from public sector bodies and government, it seemed easier to engage with business and organisations on the timescales which Peas Please was working to. It may also have been because these were the main networks that Peas Please had

access to. There is more that can be done to develop the role of governments and other public bodies but it may be that these need more time.

This raises the question of whether there a need to develop more public policy interventions through Peas Please. The UK Government has already shown signs that it is willing to try to influence in the market, reinforcing the idea that the UK might have entered a 'not quite neoliberal' period. Although agriculture has been subsidised for some time (post World War Two) the move outlined in the proposed new Agriculture Bill (Defra, 2018a), to provide subsidy for public goods marks a shift. The introduction of the Soft Drinks Industry Levy, commonly referred to as the 'Sugar Tax' on April 6, 2018 (HM Treasury, 2018) also signals that the Government is willing to interfere in the market. The UK Government is not the only country to have introduced such measures. Mexico, Hungary, Finland, France, and Berkeley (USA) all did so some years ago, showing varying degrees of decline in sugary drink sales (Scarborough *et al.*, 2016). However, as Hawkes and Popkin (2015, p.3) outline, "countries are beginning to take actions to promote healthier eating at the national level but few are truly taking on the broader food system, its priorities, and its entire structure."

Swinburn *et al.* (2015) note that there are limits to voluntary agreements and to legislation, that they are not mutually exclusive and that a combination may be beneficial. Peas Please, with its broad spread of stakeholders, is well placed to explore potential complementary legislation or other policy options. As Bryden *et al.* (2013, p.186) note, "voluntary agreements may help to improve relationships between government and business, and can help both parties agree on target-setting and data-sharing. Governments may also use the experience to help develop subsequent legislation." Peas Please presents a so-far untapped opportunity to explore different potentially complementary legislative measures. For example, a working group comprising relevant business, third sector and public bodies could be established within Peas Please to explore potential complementary legislative measures around food manufacturing. The working group could look at possible legislation around whole meal replacements, starting with exploring whether legislation around minimum standards (for example 80g) for vegetable content in whole meal replacements would be possible or impactful. The idea of Peas Please facilitating these types of policy discussions could be brought up with the pledging

community in the first instance to establish whether there is any appetite for such work.

At present the Peas Please changes pledged are a long way off achieving systemic change; but that is not to say that over time and through cascade effects and more potentially compatible public body intervention that systemic change is not possible. Peas Please has resulted in a social transformation of sorts in that there are new social structures in place to try and increase vegetable production and consumption across the UK and across the food system. The need for food system change for greater vegetable consumption has been accepted, to a degree, at a government level, as illustrated by representation from the governments across the UK on the Peas Please advisory board. Whether it can and will lead to increased consumption is as yet unknown, but more can be done.

Peas Please is however on vulnerable ground. Business and governments are relying on civil society actors to mediate. This process takes time, resources and commitment, and is happening at the moment mainly funded by the charitable sector. But the work is essential to the dissemination of this type of governance; it is a fragile social transformation which could easily be reversed. If food system transformation for better public health and greater sustainability is a key concern of governments, then they may have to recognise that this does not happen spontaneously and there is a need to consistently support mediator initiatives or adapt and take on the role themselves.

7.5.3 Peas Please compared to other food system approaches

Chapter 2 (Literature Review) outlined some different tools used to explore food system change. Ericksen's (2008) 'Global Environmental Change (GEC)' model was introduced (Figure 7), which looks at how food systems contribute to global environmental change and vice versa. It attempts to provide a model that can be used to enhance food security without further degrading ecosystem services (Ericksen *et al.*, 2010).

On reflection, the food system approach being advocated by the researcher and Peas Please amounted to a food supply system change approach. It concentrated principally on food system activities and outcomes and did not attempt to influence

GEC drivers and broader socioeconomic drivers; although it did refer to these as part of setting the context for delivery. Some data on social and environmental implications of increased consumption of vegetables was integrated into the core Peas Please narrative: for example, a likely decrease in the number of premature deaths per year in the UK by 20,000 (Food Foundation, 2016c, p.5) and eating an extra portion of vegetables (whilst reducing meat consumption) reducing the UK's diet related greenhouse emissions by 17% (Green *et al.*, 2015). However, perhaps a more systematic analysis using the GEC model would be insightful and is recommended; especially around environmental and socio-economic impacts and feedbacks. This might provide insights into other levers for increasing vegetable consumption outside the supply chain.

The Peas Please approach, set in place by the original concept note, was about building relationships with people within the food supply chain and recognising people as key facilitators of change within the system. The need for this type of work has been predicted; for instance Ambler-Edwards *et al*. (2009, p.5) commented that "collaborative relationships around the supply network will take on a new importance and become part of the drive for a more integrated approach". Ericksen (2010, p.32) also acknowledged that:

> "explicitly linking outcomes to the activities of producers, retailers and distributors and consumers is an important research consideration, as food security results from a complex set of interactions in multiple domains that are often not highlighted in conventional food chain analysis with their focus on food yields and flows."

Many food system models, like Ericksen's (2008) 'Global Environmental Change (GEC)' model[30] and Haddad *et al.*'s (2016, p.82) model[31], appear unpopulated by people (apart from the consumer) and this has been criticised on the grounds that it is actors within the system who facilitate change. Hawkes and Ruel (2011, p.4) in their value chains for nutrition approach to food system change do represent the supply chain both as a set of activities and a set of actors:

[30] For Ericksen's (2008) 'Global Environmental Change (GEC)' model diagram, see Chapter 2 (Literature Review, Figure 7).
[31] For Haddad *et al.*'s (2016) model diagram, see Chapter 2 (Literature Review, Figure 8).

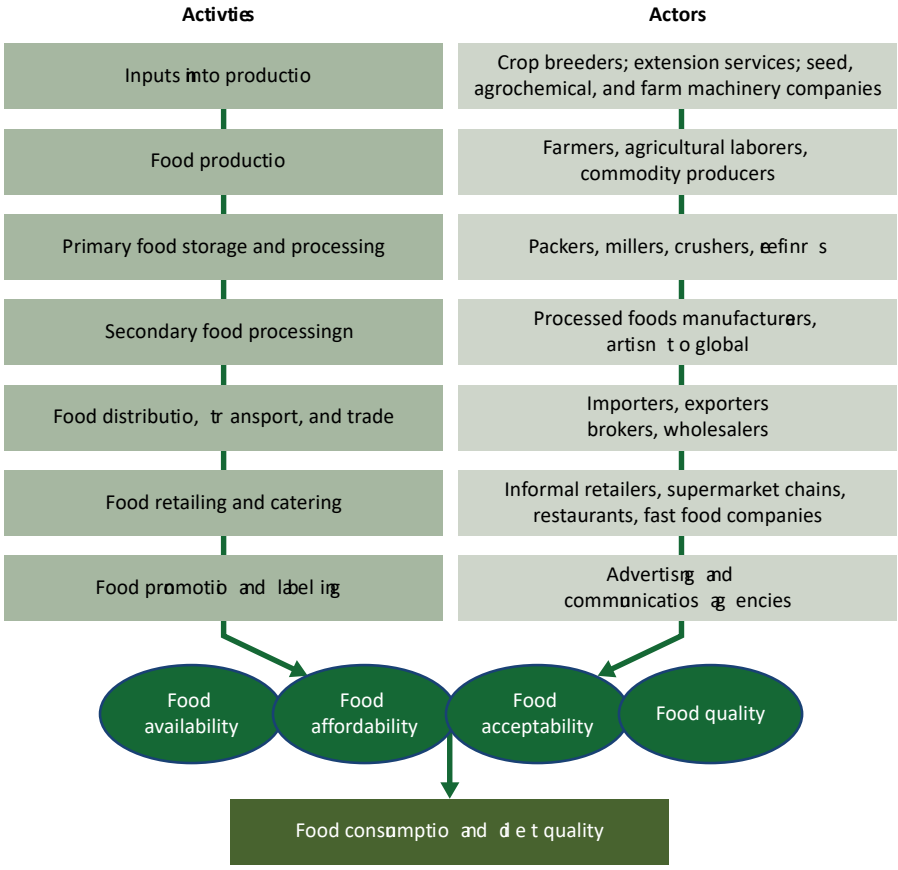


Figure 62. Value chains for nutrition representation of food supply chain, as per Hawkes and Ruel (2011, p.4).

Peas Please attempts to work in the interest of increasing vegetable consumption to improve public health. This is largely legitimised by morbidity and mortality statistics and a desire to address health inequalities. In many respects the Peas Please approach is similar to the value chains for nutrition approach suggested by Hawkes and Ruel (2012) in that it takes one food and works through a process of identifying the problem and actions. There are however differences, see Figure 63:

Steps in value chains for nutrition approach	**Peas Please approach compared**
1. Start with explicit nutrition goals	1. Define 'space of possibility' Increase vegetable consumption to public health Recommendation (now '7 a day'). No consumer insights involved.
2. Clearly define the nutrition problem	2. Establish fact base Veg Facts outlined insufficient consumption of vegetables and lower intakes for lower-income consumers.

3. Create and capture value for nutrition	2. Establishing fact base (continued) Veg Facts outlined the benefits for increasing vegetable consumption and production.
4. Be expansive in the search for solutions, but tailor to context	3. Build relationships across the food system and with Government Stakeholders identify possible actions thus tailoring to context at the same time as committing stakeholder to delivery.
5. Focus on the coordination of the whole chain	4. Co-create multi-sector action framework Peas Please ensures that actions are in line with increasing consumption.
6. Add value not only for nutrition but also for actors along the value chain	5. Facilitate key engagement events which provide unique opportunities for learning, multi-stakeholder networking and potential promotion for food system stakeholders.
7. Take a broader view of adding value for producers and consumers	6. Plug gaps in current activity for example facilitation of Fruit and Vegetable Alliance and 'Veg Power'.
8. Focus on meeting, increasing, and creating demand	This was done by business stakeholders but Peas Please played its part by facilitating the development of the Veg Power initiative to increase marketing of vegetables and incentivise demand.
9. Create a policy environment in which better nutrition is valued	7. Develop and deliver monitoring and evaluation 8. Reflect and feedback to action framework and development and continually engage with food system stakeholders and policy across the Governments of the UK.

Figure 63. Steps in value chains for nutrition approach (Hawkes and Ruel, 2012, p.79) compared to Peas Please food system approach.

The main difference is that the work did not start with a detailed exploration of the needs and experiences of the consumer in relation to vegetable consumption. This was because, like the researcher's use of the fruit and vegetable requirement, Peas Please was trying to move problem solving away from the individualisation of the food security narrative to a systemic framing and hence made a deliberate decision to steer away from involving the consumer. However, having done this and created a platform for systemic change, it seems that consumers, as potential drivers of food system change, are now actually missing from the Peas Please discussion. This was also a point that emerged from van den Berg's (2017) analysis of Peas Please. As a result, Peas Please went on to apply for funding to undertake work to more fully integrate consumers. What consumers experience, and the social and cultural aspects of consumption, might help inform how the system could be changed at the

same time as empowering consumers to advocate for system change. It is likely that this process will take time to develop and care has to be taken to ensure that processes are designed which meaningfully engage with people in ways that empower not disempower (Centre for Food Policy, 2018). Peas Please is in a good position to do this given that the model is based on a sharing of responsibility for change across the food system. One of the other main differences between the Peas Please and the value chains approach is that the search for solutions and actions around increasing demand were done primarily by food system stakeholders and not by the initiative or researcher. This co-production helped to build stakeholder buy-in and ensure that solutions were actionable and actioned.

The food system approach adopted by Peas Please, symbolised during PAR for this thesis in Chapter 6 (Peas Please, Figure 59), depicts Peas Please working at the centre in the interests of achieving the public good (increased vegetable consumption) by linking a diverse range of activities in the vegetable supply chain. On reflection, people and relationships are also missing from this diagram. It would be more representative to illustrate the Peas Please approach to food system change as follows, in Figure 64:

Figure 64. Diagram of Peas Please approach to food system change recognising the role of people and relationships as facilitators of change.

This updated Peas Please food system model better explains that the relationships between Peas Please and stakeholders in the supply chain are a key element of the approach. Peas Please in the figure above is made up of the project board comprised of CSOs, the strategic board with research and evaluation stakeholders, and the advisory board with a range of advisors from wider society including representatives from governments. People working on broader system change have also noted the importance of developing strong relationships and shared governance[32] (Vize, 2016).

Advocates of food sovereignty suggest that only addressing the food environment or supply chain, does not fundamentally change the power dynamics which are a source of food insecurity (Anderson, 2013). Moragues-Faus, Sonnino and Marsden (2017) criticise some food system approaches for not paying enough attention to the underlying politics at play in food system development. They also suggest that there are five governance deficiencies at a European food system level: failure to deal with cross-scale dynamics, unequal rights and entitlements, increasing interdependencies, power imbalances and low institutional capacities, and conflicting values; see Figure 65:

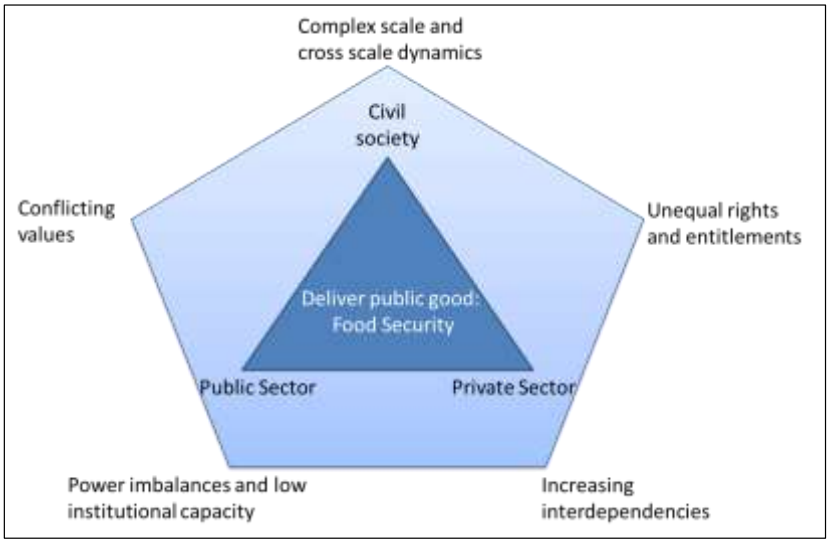


Figure 65. Food system governance deficiencies from Figure 6. (Moragues-Faus, Sonnino and Marsden, 2017, p.17).

[32] This resonates with social capital theory. Putnam, R.D. (1995) 'Bowling Alone: America's Declining Social Capital', *Journal of Democracy,* January, pp. 65-78.

Moragues-Faus, Sonnino and Marsden (2017, p.17) argue that it is “critical for policy actors to connect the linkages between our five key deficiencies in order to embody a more reflexive, democratic and integrated food security governance approach.” The governance deficiencies outlined seem to be reflected in the practical experience of Peas Please, which was effectively trying to make up for these deficiencies by ‘plugging a gap’ in service, by attempting to ‘drive the public goods wheel’. As discussed elsewhere in this chapter this involved working across regions, scales and sectors and dealing with power imbalances and conflicting values. Unequal rights and entitlements was also a recurring theme and Peas Please worked on this at a number of levels. It was often trying to highlight and deliver for the rights of those on lower incomes being able to access more nutritious diets. This came in the form of engaging with retailers and food types more commonly accessed by those on lower incomes to try and make vegetables more accessible and by engaging with stakeholders on expanding the Healthy Start voucher scheme and promoting the trial of other fruit and vegetable voucher schemes (Hinks, 2017). In terms of unequal rights across the supply chain, the differing rights and entitlements of small and large-scale producers and Peas Please’s work to try and get more support for small-scale producers has been discussed. In order to maintain a level playing field, Peas Please worked with small-scale as well as large-scale retailers. This was in the form of individual retailers, like Penylan Pantry in Cardiff, a sole trader shop, and groups of smaller scale businesses like the Association for Convenience Stores and the Sustainable Restaurant Association. The extent to which this approach meaningfully challenges power dynamics is unknown and more detailed exploration of power is recommended. This is discussed in more detail in relation to political ecology.

7.6 Reflections on theory

The previous section makes some links to theory around food systems. This section looks at potential insights that the research might provide for political ecology and vice versa. Following reflection on process, as part of PAR, Actor Network Theory is introduced as a potential explanatory tool. It is suggested that there may be benefits to combining food system, political ecology and Actor Network Theory.

7.6.1 Political ecology

The research for this thesis was based on a broad toolkit of conceptual tools aimed at offering the opportunity to explore whether convergence across different actors within the food system might effect positive change. Chapter 2 (Literature Review) highlighted a number of conceptual tools used as a basis for initial research; ecological public health nutrition, food system approaches, polycentric governance and place-based approaches from human geography and political ecology. Implications for food systems theory have been discussed but in this section theoretical implications around political ecology are expanded upon.

Combining a diversity of approaches is something which has been encouraged in food studies and by political ecologists. According to Hayes-Conroy and Hayes-Conroy (2013, p.84) political ecology has inspired scholars to take “the everything pill”. Although political ecology was not the initial overall framing for the research much of the findings around power, space, place and scale and social transformation for greater food security and sustainability fit under its umbrella and are discussed here in relation to contribution to theory.

Place, space and scale

The terms large and small-scale have been used extensively throughout this thesis. So far, the term scale has been used as a simple descriptor, but it is also a concept which is much theorised in the academic field of political ecology. This thesis does not develop the theoretical aspects of the political ecology of scale but it does have some insights which are shared here and later in relation to understanding practice. According to Moragues-Faus and Marsden (2017) agri-food research and political ecology need a new critical food scholarship in order to develop a more socially and ecologically diverse food system. The building blocks they outline (Moragues-Faus and Marsden, 2017, p.276) include “understanding place-based socio-natures” and “addressing the politics of scale”. A place-based approach was adopted for this research by linking consumption and production through the Wales fruit and vegetable requirement. This created a space of possibility where different stakeholders could attempt to problem-solve around how to increase production and consumption. But only engaging in Wales showed the limits of working at one scale; the limits of ability to affect systemic change. For example, the research for this

thesis started with interviews and workshops with CSA stakeholders and small-scale producers (as well as large-scale) in Wales. These revealed barriers and potential enablers (outlined in Chapter 5) but the sort of political championship that was needed for horticulture, whilst possible at the Wales scale, was also needed at a UK scale. By helping to form the UK Fruit and Vegetable Alliance and lobbying post-Brexit through the consultation process and through the Defra Edible Horticulture Roundtable it is possible that the sort of changes required for the horticulture sector in Wales are more likely to be supported.

When the fruit and vegetable requirement was calculated at the UK scale, and stakeholders from across the food system were engaged, the space of possibility was enlarged and became a space more likely to enable systemic change. Having the different countries of the UK represented on the project board and advisory board was an important part of the working of Peas Please as it enabled tailoring of systemic changes to specific political contexts or scales. Each country of the UK has a different social, cultural, political and environmental landscape, and having representatives from each country or scale was important to inform tailored project development and delivery. It was also a tool for leveraging change. On a number of occasions having the different countries involved helped to incentivise work in other countries. For example, leveraging funds from different countries for Peas Please and Veg Power. There were also businesses and producers working at a range of scales and with varying amounts of influence and having the diversity of scales represented helped to inform more comprehensive policy and action development.

Though evidence of the long-term impacts are yet to emerge Sustainable Food Cities have shown that places provide ‘spaces of possibility’ for exploring convergence and social transformation to more secure and sustainable food systems (Moragues-Faus and Marsden, 2017). Food Cardiff had been working in a multi-stakeholder space and it was this experience, along with established networks, despite it not being a national organisation, which made it a particularly useful addition to Peas Please. This is because the multidisciplinary or convergence work at a city level mirrors the work needed at a national level. Food Cardiff being a Sustainable Food City on the Peas Please project board helped to link city scale work to national work and vice versa. Within this framework learning points from cities could more easily be transferred to national learning. Having the different scales, national and city linked,

had a clear benefit in terms of sharing good practice, policy development, and facilitating action.

Plural actor governance

As outlined in Chapter 2 (Literature Review), Lang and Heasman (2004) describe the hollowing out of power and governance at a state level and a shifting of power to corporations. This section does not go into detailed theorisations around power or governance but provides some insights. The research for this thesis reinforces the evidence that the state no longer possesses the power, capacity or the flexibility to control the food system and that policy is not the sole mediator. Rather, there is a balance of power between state, business and civil society entities, be they networks or organisations. This has been described, in relation to cities as plural actor governance (Beaumont and Nicholls, 2008). It is a view shared by other academics, as outlined in Chapter 2 (Literature Review) for example Sonnino, Marsden and Moragues-Faus (2016) who describe governance now as polycentric, and Lang (2005, p.731) who illustrates nutrition as being 'a contested space' between state, business and civil society (see Figure 11).

Renting *et al.* (2012) contend that food governance debates have traditionally focused almost exclusively on the role of market forces and government policies in the structuring of agri-food systems and that revaluation of the role of civil society-driven governance mechanisms as a source of innovation and transformation of agri-food systems is needed. The research for this thesis adds to knowledge on civil society governance potential in food system change.

The 'public health platform' of increasing vegetable consumption being offered by Peas Please found resonance across business, government and civil society, and as such Peas Please was operating not in a 'contested space', as Lang outlines, but rather in a 'space of possibility'. This is not to say that there were not disagreements; but it was the role of Peas Please to navigate through these difficulties in order to maintain the space. Peas Please as a civil society initiative is offering a governance service in helping to translate policy into practice.

At present one of the powers of business lies in its control of the food environment; as such, businesses are key collaborators in food system change. They have some

power to change the food environment within the constraint of maintaining consumer demand and profit. Although business mainly controls the food environment, it can be influenced by policy and is influenced by consumers and CSOs, who have the power of flexibility and lobbying. Where governments have power which they are not using, CSOs can play a role in influencing. For instance, in the case of the UK Agriculture Bill consultation (Defra, 2018a), which introduced the idea of public money for public goods, Peas Please and the Fruit and Vegetable Alliance (plus others) pointed out to the Government that public health should also be considered as a public good. There is more that could be done in relation to developing the work of government to aid increased vegetable consumption and Peas Please is in a good position to help facilitate. This is discussed in more detail in the Peas Please section of this chapter.

To the extent that the state in the UK has associated itself with the productionist paradigm, it fails to offer a neutral platform where different stakeholders can come together. Either it has to retreat from explicit association with this paradigm and integrate aspects of other paradigms such as life sciences and ecological health, as per Lang and Heasman (2004), or it has to rely on civil society food initiatives which can offer more neutral platforms. These other food initiatives also have the benefit of being able to be more flexible and adaptable. In relation to system change (not specifically food) the report “The Revolution will be Improvised: Stories and insights about transforming systems” notes that “leaders, in the broadest sense, have yet to fully appreciate how difficult transformation is and the skills, perspectives and attitudes required to make it happen” (Vize, 2016, p.3). Navigating the contested space and scales in ‘not quite neoliberal’ arenas, as described by de Freitas, Marston and Bakker (2015), involves actors with a degree of ‘dynamism’. A policy has to be picked up and understood by a person in a business or an organisation for it to be translated into practice. This process is likely to be slow unless there are mediators to engage with food system actors and this has been the case, as was lamented by Lang and Heasmann in 2004 (p.261): “But progress in implementing population-wide change has been frustratingly slow”. A major finding of the PAR for this thesis is that mediation happens by people and through relationships. It may be important to have the right policies in place but without mediators to engage with the diverse players across the food system, ‘hamsters in the wheel’ as outlined in Chapter 6 (Peas Please), policies may remain unactioned. What it takes to undertake this ‘dynamic’

work is summarised in Chapter 8 (Conclusion). The power of CSOs and initiatives such as Sustainable Food Cities and Peas Please, and potentially PAR researchers, is in their potential power of agency, that is an ability to be flexible and to translate policy into practice at a pace which is adaptable to the different players in the system. This is a form of power that these actors have over government and over some large businesses.

Networks

There is also power to effect change in numbers. Callon (1991, p.133) describes a network as "a coordinated set of heterogeneous actors which interact more or less successfully to develop, produce, distribute and diffuse methods for generating goods and services". This co-ordination in many cases conveys greater power to the group members in terms of voice and influence. Initially, the researcher was to some extent 'ploughing a lone furrow' in relation to promoting food system change for greater fruit and vegetable consumption and production in Wales. This gave limited power to influence. By joining a group or network of others interested in using the same approach, potential power to influence was enhanced. The advantages of having a network of countries represented on the Peas Please project board have been discussed but this section notes some of the other uses of networks by Peas Please.

The advantages of linking the scale of city to national work have been mentioned but linking into the Sustainable Food Cities Network also extended the potential reach of the initiative. This came in terms of the 'Veg Cities' campaign for which 14 cities received funding to trial 'Veg Cities' work. This increased the reach in terms of population but also the amount of potential innovation. Sustainable Food Cities gained in terms of being part of a national campaign and Peas Please benefitted from the trialling of vegetable work at a city level and potentially learning from and spreading good practice.

The initial research for this thesis highlighted a lack of networks in the horticultural sector and although a 'Growers of Wales' network has not yet been established a number of Wales-based producer bodies came to be involved in the SME growers group and the UK Fruit and Vegetable Alliance. There was also a lack of a sustainable food network or an organisation looking at food system change in Wales;

these have now been developed in the form of Food Network Wales and Food Sense Wales. These networks provide greater potential influence and co-ordination.

Tapping in to networks of public service organisations was also beneficial to the potential reach of Peas Please. For example, Cardiff and Vale University Health Board made a Veg Pledge at the 2017 Veg Summit and subsequently Health Boards from across Wales came to be interested in developing their own Veg Pledges.

Networks of Business were also tapped into to extend potential reach; for example the Association of Convenience Stores and the Sustainable Restaurant Association. The Association of Convenience Stores has members across the country and it now presents a Peas Please award as part of its annual awards ceremony to encourage good practice. Networks within businesses were also utilised, for example, BaxterStorey who made a Veg Pledge in 2017 in partnership with PwC venue in London, went onto extend their Veg Pledge, to increase vegetable purchases to 20%, to cover all of their catering sites across the UK. This extended the reach of their Veg Pledge and extended the demographic of customers benefiting. It is an example of the ability networks have to provide cascade effects. With limited resources, it was important that Peas Please made the most of tapping in to established networks.

A quiet political ecology?

As summarised by Perreault *et al.* (2015) and discussed in Chapter 2 (Literature Review), political ecology comprises three key elements: critical social theory and rejection of positivist approach, multi in-depth direct observation to understand place-based and socio-ecological relations, and an assumed political commitment to research for the purpose of enhanced social justice and structural political change.

The research for this thesis to some extent fitted into a political ecology framing, as it critically summarised the history of food security and sustainability narratives, linking them to particular political structures, and argued that there might be opportunities for positive change if a convergent approach was adopted. It linked public health consumption requirements (fruit and vegetable ‘social’ requirement) to the environment or ecology of place through translation into land needs. It showed that the low percentage of land allocated to fruit and vegetable production, 0.1% in

Wales, was likely to be the result of political and economic factors and not ecological; the whole of the '5 a day' requirement being able to be grown on 2% of the land. It then went on to use the fruit and vegetable requirement to highlight a deficit in availability at a UK level, publicised through Peas Please and Food Foundation documents to argue for support for greater production and consumption.

According to Moragues-Faus and Marsden (2017, p.281), "dominant conventional agri-food narratives have tended to detach food and agriculture from their ecological basis, reinforcing the construction of a placeless foodscape". The fruit and vegetable requirement implicitly makes the link and enables modelling of the landscape as related to the human needs of that landscape. The requirement whilst seemingly politically neutral, actually represents a political statement as it assumes a different underlying paradigm: that responsibility for population health lies at the system level and not at the individual level. This is a 'not quite neoliberal' framing and very much in the realms of political ecology. Although not the only tool deployed, to some extent this was a successful quiet use of political ecology by Peas Please, as exemplified by the diversity and number of CSOs, academics and businesses (as well as government) committing to action to increase consumption of vegetables.

Political ecology has often been used as a tool to expose "unjust and unsustainable socio-natural mechanisms" (Moragues-Faus and Marsden, 2017, p.279) and, as Leff (2015, p.70) points out, is often "in alliance with resistance movements and their political strategies"; for instance peasant movements, 'alternative' food networks, food sovereignty discourses and agro-ecological practices. It is often deployed in order to facilitate greater equality and proliferation of currently marginalised sustainability practices. It could be that political ecology is so associated with these narratives that it is impossible for it to be associated with more heterogeneous food systems with a broad range of stakeholders including 'mainstream' ones.

Although Moragues-Faus and Marsden (2017, p. 280) argue that what political ecology "offers is the capacity of integrating nature more fully in understanding food (in)security dynamics without depoliticising those analyses and their fatal implications, i.e. the reproduction of inequality". This thesis suggests that although there is a need to maintain a deep awareness of the politics at play and to explore the complexity of that in great detail, there may be a need, if political ecology is really

going to break down the power imbalances and lead to diverse and transformed food systems, to disengage from politicised rhetoric in some scenarios. These are the ‘spaces of possibility’ which hold the potential to offer convergence between divergent actors in the food system. Nourish Scotland’s Veg Pledge finding experience may provide an example of how open politicisation may inhibit food system work. The reason why Nourish Scotland did not initially secure as many Veg Pledges as the Food Foundation and Food Cardiff may have been a result of their core vision which, in line with the ‘alternative’ food system paradigm, problematises the concentration of power and the results of neoliberalisation in the food system. Their initial lack of success in securing pledges might centre on the tension between that goal and being an organisation which explicitly campaigns on food justice issues, especially for food producers working at small scales, and the problems of the concentration of power in the food system. There may additionally have been an element of not wanting to add to that concentration of power by helping big businesses to sell more vegetables, perhaps at the expense of small-scale businesses. When problems of the food system are framed as per the ‘alternative’ food system paradigm which problematises concentration of power and results of neoliberalisation, this problematisation can extend to stakeholders within the food system and potentially works against relationship building with stakeholders who are within large-scale businesses. Having said this, Nourish Scotland did work with a broad range of stakeholders and eventually, with the help of a consultant who was more at arm’s length from their core vision, managed to secure a range of Veg Pledges by October 2018. It is important that there are vociferous advocates for those in less powerful situations and influence, but it is contended that it may also be important to have ‘convergers’, actors within the food system who use political ecology differently. This latter approach, typified by Peas Please, is perhaps a ‘quiet’ political ecology, dedicated to equality and broad sustainability at the core, but keeping it unarticulated in instances where it can be divisive or might reproduce inequality by alienating potential facilitators of change from other paradigms.

Alienation can also happen at a policy level; for example, the following quotation on food system change in the editorial of Lancet Public Health shows the adversarial role policy makers sometimes adopt:

> "A great disconnect remains between policy makers who issue recommendations and communities themselves that struggle with obesity … It is time for a conscious attack on commercial interests and a radical rethinking of the dominant economic and political models that have too little interest in equity or social justice." (Lancet Public Health, 2018, p.153)

It is arguable that there is a need for this kind of advocacy in order to galvanise action. However, direct experience of engagement with commercial interests suggests that sometimes, in order to facilitate the systemic change advocated, a less confrontational approach is required. Hayes-Conroy and Hayes-Conroy (2013, p.88) highlight a relevant quotation from a food activist: "Judgment is really toxic when it comes to food … I think there (needs to be) room for everything, and room to listen in. Food is cultural and emotional and social and nutritional and we need a space for it to be all those things." Openly politicising can reproduce inequality by problematising processes and actors in the food system. What is needed at times is a clear focus on outcome, with equality and sustainability as core principles, but a flexibility on the accepted processes to achieve it.

This mirrors the approach taken in the research for this thesis: a toolkit of different theories was employed along with a toolkit of different methodological techniques. This showed a commitment to a flexibility of process at the same time as there being a clear focus on the problem; in this case, low consumption and production of fruit and vegetables in Wales and the UK. Tornaghi (2014, p.11) suggests (in relation to urban agriculture) that we:

> "need a body of theory which is able to engage in a transdisciplinary dialogue with the field of policy-making and civil society to propose alternatives and repoliticize a neglected field of urban living. By 'transdisciplinarity' … I mean a practice of inquiry which goes beyond academic disciplines and aims to create a dialogue with civil society organizations to forge alternatives."

And that:

> "Building these ecosystems requires a critical food scholarship which attempts to "politicize, empower and identify alternatives"…" (Moragues-Faus and Marsden, 2017, p.276)

This thesis proposes that "building these ecosystems" involves a critical food scholarship which differs slightly from the critical food scholarship suggested by Moragues-Faus and Marsden. A food scholarship which does not openly politicise but which uses a food system approach, with equality and sustainability as core

principles. Providing less openly politicised ‘places’ or ‘spaces of possibility’ can help to level power and provide integrational spaces for ‘alternative’ and ‘mainstream’ stakeholders. Far from being ‘fatal’, a less overt politicisation, may actually be integral to emancipation in certain scenarios.

Robbins (2012, p. 252) contends that political ecology “is not sufficient by itself to address the problems of … urban food and health, which demand the bridging of new communities of diverse concern and the immersion of researchers into spaces of practice ” but that it is “unquestionably the case that insights from Political Ecology, the power of its text, and theoretical traction it provides are prerequisite to meaningful engagement.”

As a suggestion for further research, a deeper political ecology analysis beyond process is likely to be beneficial, with greater consideration of power, urbanisation, class, race, gender and ethnicity and of the implications for other countries of increasing production and consumption of fruit and vegetables in the UK. For example, this thesis found that the UK horticulture sector needs support to develop, not necessarily in terms of direct subsidies but infrastructure, trials, research and so on. Whilst many other countries, for example the Netherlands, do invest in their sectors to a greater degree, others, for example countries with lower incomes, do not; and their producers selling on the world markets are therefore at a disadvantage. Increasing support for domestic production, in a relatively rich country, might in itself serve to reproduce inequalities worldwide. In order to ameliorate this, increased fruit and vegetable production in the UK might be complemented by development of fairer trade with other countries as suggested by Morgan’s (2010) paper ‘Local and Green, Global and Fair’. A deeper political ecology analysis might explore the ecological and social implications for fruit and vegetable production and consumption scenarios in greater detail, and would be recommended.

7.6.2 Convergence in theory: combining political ecology, Actor Network Theory and a food system approach

The literature review outlined a range of theoretical tools being used as a basis for the research for this thesis. This gave a flexibility of process and facilitated the methodological diversity beneficial to PAR. In hindsight this ‘clear about outcome but

flexible about process' ethos was shared by Peas Please practitioners as a whole, and this is reflected upon in the conclusion.

In this chapter so far, contributions to political ecology and food systems change have been explored in detail. However during PAR it was discovered that an important aspect of guiding change was the development of relationships and networks of convergent and divergent communities of practice, including fruit and vegetables themselves as 'known champions' for human health improvement. This moves the research more into the realm of Actor Network Theory. Political ecology has been challenged by "ideas that move away from a narrow focus in social theory on 'pure' human society and culture, and emphasise the complex ways that humans and non-humans are entangled" (Watts and Scales, 2015, p.226). Actor Network Theory does this by assuming that human actors and 'objects' are linked together in networks (Latour, 2005). For instance Latour (1993) describes the 'Pasteurization of France' and stresses that as well as social and ideological changes in human society, microorganisms themselves (as 'objects') are not inert but rather influence and effectively become part of alliances that produce political outcomes, for example the success of Pasteur (Robbins, 2012).

In common with Watts and Scales (2015) this thesis suggests that, although not straightforward, there may be benefits to combining political ecology with Actor Network Theory in terms of progressing the understanding the complex dynamics at play in food system change. Through an Actor Network Theory lens, vegetables can be seen as actors with Peas Please assuming an advocacy position. It was not an accident that Peas Please chose to champion vegetables, it was because vegetables were natural allies: they are associated with positive health benefits, a diverse range are able to be grown in the UK (perhaps more easily than fruits) with a lower carbon footprint than other forms of food, such as meat. Vegetables were also suffering from a lack of advocacy in the system. Vegetables were not inert or in the background but very much part of conversation. Peas Please effectively became an 'agent' of vegetables and was perhaps, subsequently effective because of them. Through Peas Please vegetables and aspects of vegetable production were more fully brought into human networks. There are other actors that have a large ability to affect the fruit and vegetable food system, the ecological land base, the weather, a war, technology, the economic climate and so on. These can be seen as actors in the network. A greater

exploration of Actor Network Theory in relation to Peas Please's food system approach may be insightful.

Political ecology is sometimes criticised for its tendency to bifurcate; that is to divide the world into opposing categories, for example nature and culture, rural and urban, local and global, and usually to see one side of the dichotomy as dominant to the other (Castree, 2002). It has already been argued that, in terms of trying to offer convergence, binary thinking is not necessarily facilitative. Actor Network Theory moves ideology away from binary thinking:

> "ANT (Actor Network Theory)'s ontology is one of 'symmetry'… where all objects and organisms are potential actants with the ability to influence the world. Having identified actants, ANT then seeks to trace the associations between them, linking them together into a network…" (Watts and Scales, 2015, p.7)

The finding of the research for this thesis was that the situation is nuanced, complicated, contingent and relational and that a networked mechanism of system change is closer to reality. One of the criticisms of Actor Network Theory is that it can make a situation appear so complicated that it lacks coherence and has little to offer apart from 'it's complicated'. However here it may more usefully explain the interactions which led to the development of Peas Please, the pledges and the fruit and vegetable requirement enabling the establishment of a new Fruit and Vegetable Alliance that is diverse in constituency.

Political ecology has been critiqued for its tendency to rely on 'pre-given sociospatial containers' and to treat certain actors as 'black boxes' (Watts and Scales, 2015, p.230). To some extent, Sustainable Food Cities and place-based approaches are one of these 'black boxes' endorsed for their positive outputs (King, 2017) but without much consideration of what it takes to make them work. Although Actor Network Theory has some theoretical insights to offer in terms of the power being in the networks it does not fully explain how the networks operate. Moragues-Faus and Marsden (2017, p.275) describe three important factors to the development of a new critical food scholarship which are "understanding place-based socio-natures; addressing the politics of scale and inequality; and co-producing knowledge and change." This research has insights to offer on all three of these.

There are therefore reasons to combine political ecology, Actor Network Theory and food systems theory to give a more complex and cohesive picture of what it might take to achieve change. Political ecology would give insight on power dynamics at play, ideas about how places and scales influence this; Actor Network Theory would provide an insight into the people and relationships which help transform systems and food systems approaches, an understanding of the whole and how it all fits together, and how this links to consumption. Expanding on this is beyond the scope of this discussion but is a recommended as a potential area for further research. More could be done in terms of theory development but this thesis is primarily concerned with the theory around practice and what it takes to facilitate system change. Neither political ecology, Actor Network Theory nor food systems approaches really describe the processes involved in trying to make change happen. What it takes to try to make changes, to undertake the Peas Please approach, was witnessed and experienced by the researcher through PAR. It amounts to a combination of a number of key practices which are best described under the heading of diplomacy. This is expanded upon in Chapter 8 (Conclusion) along with recommendations for policy and practice.

7.7 Reflection on Participatory Action Research (PAR)

PAR is not a straightforward methodology to use, especially as part of a PhD process. As outlined in the methodology chapter, it “knows it is coming from somewhere and going to somewhere, even though it does not know in advance where *precisely* it is going to end up or what the new state will look like” (Wadsworth, 1998, p.4). This section summarises the benefits of the approach in relation to the research for this thesis and then looks at some of the challenges. It ends with some recommendations for practice.

7.7.1 PAR benefits

It is useful to refer back to a quotation from Cahill and Torre (2007, p. 205) from Chapter 3 (Methodology) in order to reflect on the potential impact of the PAR for this thesis:

> "The challenge for PAR researchers who are serious about social change is to think through how to effectively provoke action by developing research that engages, that reframes social issues theoretically, that nudges those in power, that feeds organising campaigns, and that motivates audiences to change both the way they think and how they act in the world."

The research for this thesis may have fulfilled the above criteria. It began by engaging stakeholders in Wales on the fruit and vegetable requirement and a food system approach to public health nutrition, and then went on to engage with UK stakeholders through Peas Please. The fruit and vegetable requirement, a seemingly benign calculation, reframed the problem of low fruit and vegetable consumption from being an individual problem to being a systemic problem. When the research presentation was first being given, stakeholders seemed to know intuitively that the '5 a day' campaign had not improved consumption but they perhaps lacked the research to back up the assertion. Evidence that consumption had gone down over the period of the campaign was probably accepted because people already knew intuitively that this was the case. They also probably understood that the individual approach to public health had not worked and there was a need to try another approach. So the suggestion that a systemic approach might be worth trialling may have been more easily accepted. The food system approach diagram was presented repeatedly to engage stakeholders in reframing the problem of public health from being an individual to being a systemic problem and may have motivated the 'audiences to change the way they think'. Through PAR the food system approach to public health may have become accepted more quickly in Wales. Through the PAR for this thesis Food Cardiff became involved in Peas Please. Peas Please then contributed to the evolution of Food Cardiff's work to Food Sense Wales work, and hence the development of a Wales-based organisation working on food system change. Food Cardiff and the emergent Food Sense Wales used the food system diagram from the research presentation for this thesis on numerous occasions, to illustrate the approach being undertaken, including at the Public Health Wales AGM in 2018. The simplified diagram had been developed through PAR to be of use as an explanatory tool and it was used as such. Referring back to Chapter 3

(Methodology), Chatterton, Fuller and Routledge (2007, p.218) suggest that PAR should “produce critical interpretations and readings of the world, which are accessible, understandable to all those involved, and actionable.” The fruit and vegetable requirement and the food system approach diagram were examples of this.

It is arguable that the fruit and vegetable requirement and food system approach may have ‘nudged those in power’. Although this thesis has found that there are different types of power and that actors in the food system have a power to affect change in different ways, it is the case that during and following the PAR, those in government became more aware of the fruit and vegetable deficit and the need for systemic change. In Wales, a food system approach to increasing fruit and vegetable consumption moved from a ‘lone furrow’ to wider acceptance, illustrated perhaps by funding and support for Peas Please from Welsh Government and endorsement by the Welsh Government First Minister. Presentation of the UK fruit and vegetable requirement also helped facilitate the development of the Fruit and Vegetable Alliance and the Defra Edible Horticulture Roundtable.

Engaging the research in real time helped ‘feed organising campaigns’ in the form of helping with the development of Peas Please. The research for this thesis was presented to stakeholders in Wales and the barriers and enablers to production and consumption were explored, but this was not enough in itself to initiate change. Research data was then fed in to the Peas Please initiative, with the understanding that if a researcher wants to facilitate positive change it is not always enough to provide information. There is a role for researchers to engage with stakeholders and to facilitate change. Change of the type that is desired is unlikely to just happen, it takes work, as the Peas Please diagram indicates: Peas Please in the middle of the food system wheel attempting to link all the elements and drive change. In terms of the development of Peas Please, particularly the work in Wales, Peas Please was able to benefit from the research for this thesis, in terms of having a human resource with the relevant skills, knowledge and networks to facilitate the work. The PhD researcher in turn benefitted in terms of depth of research experience and potential ability to affect change. PAR offers the opportunity to link research and practice. Williamson (2002, p.122) in relation to developing better youth policy in Europe notes that “this again highlights the need for more robust relationships not only between

research and policy … but also between research and practice." This illustrates the point that there is a need for good relationships between research and practice, an observation which applies across disciplines.

There were two significant policy changes which made engaging with research in real time more of an imperative during the research period. These were, in Wales, the introduction of the Well-being of Future Generation (Wales) Act (Welsh Government, 2015b) and, at a UK level, the Brexit decision. After the Well-being Act was introduced, the fruit and vegetable requirement research was perhaps better received as it explicitly identified the health of the population as a target and linked it to possible policy development and action. At a UK level, in relation to the consultation on the post-Brexit Agriculture Bill, the fruit and vegetable requirement was used to suggest that the expansion of fruit and vegetable production could contribute to public health, and that public health should be incorporated as a public good.

7.7.2 PAR challenges

Although PAR is presented in this thesis as a clear process, the experience of it was much less straightforward. The researcher was often acting on the instincts of an activist and then trying to make sense of action in hindsight. This is not a new finding. Marris and Rein wrote of the complexities of action research in 1972:

> "The final outcome cannot simply be related to the initial aim and method, since these have undergone false starts, frustrations, adaptations, the successive recasting of intentions, the detours and conflicts – needs to be comprehended. Only then can we understand what has been achieved, and learn from the experience." (Marris and Rein, 1972, p.260)

It is periods of extended critical reflection which distinguish PAR from action per se. It was necessary to pull back from action at times, for critical reflection and writing up, and when help was required; and whilst this was accepted as necessary it was not always beneficial for the initiative. However, insights were often fed back in to the initiative in an iterative cycle which helped with ongoing development. Peas Please was continually using an iterative cycle of research, action, reflection and so having a PAR researcher involved was complementary. There was also a clear need to integrate different types of research into Peas Please, both quantitative and qualitative, and the researcher was in a position to help facilitate this where possible.

To reflect back on Chapter 3 (Methodology), a criticism of PAR by Stoeker (2009, p. 386) is that there are “an increasing number of participatory and action-oriented research projects that are neither participatory nor result in any action”. A criticism of the PAR for this thesis could be that it was more action than research and at times this was the case. To meaningfully engage it is necessary to become immersed, and this may mean doing things which are unrelated to the research. It is not always clear what is part of the research and what is not and this makes it a time consuming process. The challenge is to engage at this level at the same time as continually critically reflecting on practice. Time for critical reflection is sometimes limited and research might be shared which is incomplete or which lacks sufficient analysis. This is one of the downsides of sharing research in real time and could affect the credibility of the research. The extent to which someone can critically reflect on their own and colleagues’ actions objectively is perhaps limited, but PAR does provide an opportunity to reflect on practice in a way which would be hard to do otherwise.

Some of the criticisms of qualitative research, and potentially PAR, mentioned in Chapter 3 (Methodology) are that it is too subjective, unsystematic, difficult to replicate, and that it lacks transparency. The PAR for this thesis was definitely subjective, it was systematic in that it followed the iterative PAR cycle, but this was not always as circular as the model implies. It would be hard to replicate, like most qualitative research, and may lack transparency, though the methodology was clearly outlined. However, these factors also make it particularly useful for analysing practice. Goodman, DuPuis and Goodman (2012) propose that agri-food scholars concerned with sustainable agri-food systems should focus upon practices rather than value-based or scalar-dependent concepts.

Hawkes and Halliday (2017, p.94) in their International Panel of Experts on Sustainable Food Systems review on ‘What makes Urban Food Policy Happen?’ argue that “Political champions who make the case for a policy by framing it around city priorities are very helpful for obtaining commitment”. This research would suggest that rather than being ‘very helpful’, they are integral. Williamson, in relation to youth work, but relevant here to the reflection on process, has explored the relationship between practice, policy and research. He proposes that there is a clock or cycle of policy development and implementation:

> "policy … is developed through a recurrent cycle of political decision-making and drive, professional delivery, robust debate on emergent challenges and difficulties, and further policy development. The impetus for such development may start at any of these points and, equally, may be obstructed, for many reasons, at different points in the cycle. For the momentum to be maintained, there needs to be rigorous reflection on the current state of … policy … and a close relationship between research, policy and practice. Of paramount importance, however, is the need for the political championship of new agendas for change in response to the emergent needs." (Williamson, 2002, p.8)

The research for this thesis generally agrees with the cycle above but it goes a level deeper to look at the practitioner and what it takes to secure the 'political championship of new agendas for change'. Or, as referred to earlier, what it takes to work within the 'black box' (Watts and Scales, 2015, p.230). This would not have been as possible had the researcher not been engaging in PAR and specifically Solidarity Action Research, that is to say actually experiencing what it might take to push a new agenda forward with other stakeholders. So, although the research for this thesis is subjective, it is actually its subjectivity which gives it validity. This quotation from Marris and Rein (1972, p.260) is insightful:

> "Even though no one ever again will make exactly the same journey, to follow the adventures of the projects offers a general guide to the dangers and discoveries of their field of action. From such a guide anyone may evaluate the experience according to his purposes."

It is hoped that given sufficient critical reflection on the subjective experience of Solidarity Action Research, the findings will be useful to others interested in achieving similar ends.

7.7.3 PAR recommendations for practice

Where finances are scarce and social and environmental needs are pressing there is a role for research students to use their research time to contribute towards research and practice in real time. One way of doing this is by adopting a PAR methodology. Moragues-Faus and Marsden (2017, p. 281) suggest that a new critical food scholarship can be enriched "through a focus on place-based socio-natures that explicitly address multi-scalar politics producing inequalities and a commitment to co-producing knowledge and change". This thesis contributes to this new critical food scholarship around the co-production of knowledge and change. It is not always easy, and results are not guaranteed, but persistence, reflection and ability to change

do help. These are some aspects of practice which were shared by the researcher and the rest of the Peas Please project board and are summarised in the final chapter.

7.8 Summary

This chapter began with a discussion of neoliberalisation and suggested that the approach being employed by the researcher and Peas Please lies in the realms of 'not quite neoliberal' food system development. It then looked at divergence in the food system and the benefits and complexities of convergence and the limits of linking production and consumption alone and the need for a more systemic approach. The food system approach adopted by Peas Please was explored and compared to other approaches, illustrating that the approach is founded on building relationships across the food system. The strengths and weaknesses of the approach were elaborated on. Whether this approach can lead, or has led, to social transformation, or could lead to increased vegetable consumption, was also discussed. The chapter then looked at related theory, political ecology and Actor Network Theory, and suggested that a combination of these with food system approaches might offer a better explanatory tool. The final section of this chapter critically discussed the Participatory Action Research process and its potential contribution to change as well as the challenges of using the approach and recommendations for practice. The complexities of the food system and the divergences between actors means that to make 'spaces of possibility' work entails using a great deal of mediation or diplomacy. It is the process of this diplomacy which is integral to working within the space, not the spaces or initiatives themselves, which are just windows of opportunity utilised by these facilitators of change. This diplomacy can be utilised by a myriad of actors within the food system, including researchers. The elements of practice which make up this diplomacy have been touched on throughout this thesis but are summarised in the next and concluding chapter.

8 Conclusion – A New Food Diplomacy

8.1 Overview

This concluding chapter looks back over the Participatory Action Research (PAR) journey of this thesis and then reflects on what it might take to facilitate food system change. The journey started by asking whether greater convergence in the food system could facilitate better public health nutrition by combining production and consumption. The thesis went on to explore the population fruit and vegetable requirement and barriers and enablers to fruit and vegetable production, and culminated in a discussion of the development of Peas Please, an initiative advocating a systemic approach to increasing vegetable consumption. The results suggested the Peas Please approach offers the possibility of positive change. Having come this far, this chapter turns to examine practice and finds that in order to attempt to facilitate change a new food diplomacy must be used. What this entails is discussed and it is recommended that a new food diplomacy be recognised, supported and taught.

8.2 Review of thesis

Chapter 1 introduced the divergence between the 'alternative' and 'mainstream' food system, symbolically depicted by two simultaneous farming conferences at different ends of the same street in Oxford every January. It went on to detail some of the problems faced by the modern food system in terms of ecological degradation, resource depletion, increased competition for resources, nutrition transition to unhealthier eating patterns and the rise of associated non-communicable diseases. It introduced the main aim of the research for this thesis: to explore whether a more convergent food system approach or path might facilitate better public health nutrition.

Chapter 2 (Literature Review) gave a brief history of the development of the modern food system. It linked this to the food security narrative and to productionism and neoliberalisation. It then explored suggested solutions often expressed as alternative to the dominant neo-productionist food security approach; such as food sovereignty, the right to food, the livelihood approach, community food security and sustainable

diets. The concept of an ‘alternative’ versus ‘mainstream’ divide was explored revealing that it is not a simple dichotomy. A broad range of theoretical tools was introduced to conceptualise convergence and system change; amongst these were ecological public health, food system approaches, and political ecology. It was suggested that combining public health nutrition and agri-food research might be a useful starting point, and that one way this could be done was by linking production to place of consumption. The rationale for adopting a systemic approach was given, particularly the lack of effectiveness to date of the individually focused ‘5 a day’ campaign. The reason for starting with Wales and fruit and vegetables, to link consumption and production of place, was outlined. The specific research questions, to answer the main question of how is greater food security and sustainability best achieved, were introduced.

Chapter 3 (Methodology) went on to discuss the chosen research methods and outlined the rationale for adopting PAR, and particularly Solidarity Action Research. The benefits and drawbacks were discussed. A triangulated mixed methods approach was proposed and exact methods were outlined in more detail. These included utilising secondary data and public health recommendations to calculate population fruit and vegetable requirements and presentation of a food system approach to public health nutrition. In total 178 stakeholders, mainly Welsh producers and support bodies, took part in 39 semi-structured interviews and 12 workshops. In addition there were another 11 strands of participatory engagement, including engaging in the development of Peas Please.

Chapter 4 (Requirement) introduced the Wales and UK fruit and vegetable requirement calculations as well as the impacts of presenting these to stakeholders. The calculations showed that fruit and vegetables are produced on only 0.1% of land in Wales and provide an estimated 5% of the population’s fruit and vegetable requirement, and that it would take 2% of the land in Wales to grow enough fruit and vegetables for the population to eat ‘5 a day’; or 2.8% of the land to grow ‘7 a day’. They also showed at a UK level that there is a fruit and vegetable deficit overall in that there are not currently enough fruit and vegetables produced or available for the UK population to meet public health targets of ‘5 or 7 a day’. The chapter also looked at how stakeholders reacted to the research, the average thinking that 60% of the requirement should be grown in Wales (as opposed to 5%). Those trying to influence

policy found the 2% of land in Wales to produce ‘5 a day’ a useful statistic. Overall, the research on fruit and vegetable requirement provided quantifiable, quotable evidence of public health requirements that could be, and was, used to lobby for increased horticultural production and support for increasing consumption; both in Wales and in the UK. The requirement was also used to form very broad production scenarios. These provided the crude beginnings of workings which with further engagement from stakeholders could be developed and formed the basis for national policies to support the development of a diverse horticultural sector in Wales and the UK. The chapter found that although useful information and helpful to illustrate and incentivise, the research in itself did not necessarily help to bring about change because of a number of barriers being faced by producers. Talking about increasing production and consumption with producers led to a wide discussion of barriers and possible enablers.

Chapter 5 (Barriers and Enablers) outlined the results of critical reflection on interview and workshop findings around the barriers and potential enablers to greater horticultural production. These differed slightly between large and small-scale producers but, in the main, were shared across the ‘mainstream’ and ‘alternative’ divide. They are summarised in the next section (8.3) which reflects in more detail on the research questions.

Chapter 6 (Peas Please) outlined the development of Peas Please, a national initiative aimed at increasing the consumption of vegetables by addressing supply side barriers. This was reported from a Wales perspective through the eyes of the researcher engaging in PAR and particularly Solidarity Action Research. It detailed the origins of the initiative, the Vegetable Retreat, launch of Veg Facts, Food Cardiff joining the project board, participatory workshops leading to the development of the commitments framework, the Veg Pledges from across the supply chain and the 2017 Vegetable Summit. It then looked at monitoring and evaluation, Veg Power and the development of the Fruit and Vegetable Alliance.

Chapter 7 (Discussion) began with a discussion of neoliberalism and suggested that the approach being deployed by the researcher and Peas Please is in the realms of ‘not quite neoliberal’ food system development. It then looked at divergence in the food system and the benefits and complexities of convergence, the limits of linking

production and consumption and the need for a more systemic approach. The food system approach adopted by Peas Please was explored and compared to other approaches, illustrating that the approach is founded on building relationships across the food system. The chapter also looked at related theory, political ecology and Actor Network Theory, and suggested that a combination of these with food system approaches might offer a useful explanatory tool. Finally, the chapter discussed the use of PAR.

8.3 Reflection on research questions

This thesis explored the question of ‘How is greater food security and sustainability best achieved?’ It did this by following four lines of enquiry:

1. Can convergence lead to change?
2. What are the barriers and enablers to greater fruit and vegetable production and consumption?
3. Can Participatory Action Research (PAR) help facilitate change?
4. What practices are required to achieve change in the food system?

This section summarises the findings of the first three areas of enquiry and introduces a more detailed discussion of the findings of the fourth, around practice and what it might take to deliver change for greater food security and sustainability.

Linking production to consumption in the form of the population fruit and vegetable requirement shifted the food security onus from the individual to the system level and showed that there were systemic barriers to consumption. Using PAR early in the research process helped to make the case to stakeholders for a more systemic approach to improving diet. Explaining, through the PAR process, that the consumer focussed ‘5 a day’ campaign had not been effective at delivering dietary change and introducing the fruit and vegetable requirement to a wider group of stakeholders, opened up the idea that a new food system approach may be required. The findings of the research, such as ‘it would only take 2% of land to produce ‘5 a day’ in Wales’, were quoted widely for lobbying purposes. This was a potentially necessary step to an acceptance a food system approach to public health nutrition in Wales.

The fruit and vegetable requirement was convergent in that it brought ‘alternative’ and ‘mainstream’ stakeholders together as both were interested in increasing fruit and vegetable production and consumption. Small and large-scale producers could both be encompassed in production scenarios that would fulfil the fruit and vegetable requirement. However, research is not enough in itself to bring about change – it is useful insofar as it provides people of influence within the system with incentive or information to instigate change. There were a range of barriers to production that were beyond the power of producers to overcome alone. The incentive for change was there but the ability to instigate change was limited.

Barriers to fruit and vegetable production discussed by stakeholders were the challenge of ‘squaring the circle’ and how to make a living from selling fruit and veg at the same time as producing an affordable product; lack of fairness in the system; training and labour issues; lack of research and development; the constraints of seasonality versus desire for exotic fruit and veg and the culture of fruit and veg consumption; marketing of fruit and veg; and the systemic ‘chicken and egg’ challenge in terms of whether to increase consumption or production first. Overlying these barriers was a divergence within the sector and general lack of policy direction and vision which in itself may have been a barrier to development. Suggested enablers were a bold public policy vision, investment in research and innovation, infrastructure and training and the formation of alliances. One of the main findings was that engaging with production and consumption was unlikely to be convergent enough to overcome the barriers outlined to drive the increases in fruit and vegetable consumption and production required. It was suggested that it may be facilitative for multiple stakeholders from across the supply chain to work together simultaneously as part of a systemic approach. Without a convergent theoretical framework these sort of insights may not have emerged. The exploration of barriers and enablers, although insightful, was not in itself enough to facilitate change. At the time of the research there was no available mechanism at a UK level to increase consumption and production of fruit and vegetables simultaneously.

Participatory Action Research, in this case, was possibly facilitatory of change in that it enabled the researcher to collaborate in the development of Peas Please, a new national initiative to increase vegetable production and consumption. This moved the research from exploring convergence of theory to exploring convergence in practice

and addressed some of the barriers which had emerged from stakeholder engagement and actioned some of the suggested enablers. The establishment of the UK Fruit and Vegetable with a link to a Defra Edible Horticulture Roundtable has brought producers from ‘alternative’ and ‘mainstream’ sectors together under one umbrella and this convergence has the potential to facilitate greater production of fruit and vegetables. Change has occurred in the form of new structures and commitments from across the food system to increase consumption and production of vegetables. At this point however, it is a fragile change relying heavily on the existence of a small project board funded in the main by the charitable sector. There is some way to go before Peas Please could deliver the scale of change necessary, if this is at all possible. Given more time, more pledges, cascade effects and possible policy interventions this may become possible and evaluation over the coming years will help clarify. However, what it is providing in the meantime is detailed experimentation with the possibilities of positive change within a neoliberal context.

There is a potentially mutually beneficial relationship possible when research students engage in PAR with initiatives working on trying to deliver positive change, particularly in relation to helping to reflect on practice. Engaging in PAR and using a food system approach involved a range of practices which were complimentary and possibly facilitatory of change. The key aspects of the Peas Please food system approach were working in a space of possibility, representing a public good, identifying levers for change, working with people as key facilitators of change, simultaneous engagement, co-production, using established networks, continually integrating and reflecting on research, plugging gaps in activity and being fun and positive.

In answer to the question of how food security and sustainability are best achieved this thesis finds that it is the practices involved that hold the greatest potential to delivering change. These practices, it is argued, amount to a new food diplomacy and include: a clear focus on vision but flexibility on how to get there; empathy and inclusivity; navigating power dynamics; humility, listening and admitting you don’t have all the answers; being social; pragmatism; using a range of research techniques, communicated simply and well; using the art of the possible and power of the positive; persistence and the ability to adapt and change, and being a reflective

practitioner. This is discussed in more detail in the next section (8.4) and recommendations are outlined in section 8.5.

8.4 A new food diplomacy

This thesis argues that a new food diplomacy is key to facilitating change in the 'not quite neoliberal' space, where the food system is asked to deliver not just economic sustainability but social and environmental outcomes. The complexities of the food system and the divergences between actors mean that to make 'spaces of possibility' work entails using a great deal of mediation or diplomacy. It is the process of this diplomacy which is integral to working within the space, not the spaces or initiatives themselves, which are just windows of opportunity utilised by facilitators of change. The thesis takes a step inside the 'black box' (Watts and Scales, 2015, p.230) to examine the practices at work, under the heading of a new food diplomacy, when trying to deliver food system change for better nutrition. Going back to Chapter 3 (Methodology), the PAR for this thesis helps to answer Schoen and Lang's (2016, p.3) question: "What will it take for consumers, food chains and government to unlock the current lock-in of deficient supply and consumption?" Reflecting on Chapter 7 (Discussion) the thesis looks at what it takes to undertake "political championships of new agendas for change" (Williamson, 2002, p.8) and what the 'dynamism' might involve, in reference to 'not quite neoliberal' work (de Freitas, Marston and Bakker, 2015).

The elements of practice which make up this new food diplomacy have been touched on throughout this thesis but are brought together in this chapter. This new food diplomacy involves at least ten key practices (see Figure 66) and can be utilised by a myriad of actors within the food system including researchers:

	A New Food Diplomacy
1	Clear focus on vision but flexibility on how to get there
2	Empathy and inclusivity
3	Navigating power dynamics
4	Humility – listening and admitting you don't have all the answers

5	Being social
6	Pragmatism – choosing your battles, using available levers
7	Using a range of research approaches communicated simply and well
8	Using the art of the possible and the power of the positive
9	Persistence and the ability to adapt and change
10	Being a reflective practitioner

Figure 66. A new food diplomacy, key aspects of practice in food system change work, a reflection on PAR.

As well as reflecting on practice for the purposes of this thesis, the researcher also reflected on practice with the Peas Please project board[33], and there was general agreement that the practices outlined helped to deliver the approach being undertaken. To some extent this information was interesting though not that relevant for people involved as they were already doing it. However, it is hoped that the information may be useful for those who are interested in becoming involved and to those in policy arenas such as governments, academic institutions and funders interested in facilitating systemic change. The new food diplomacy practices are discussed here in more detail in relation to Peas Please and the research for this thesis.

Clear focus on vision but flexibility on how to get there

The fruit and vegetable requirement provided a clear vision for what the fruit and vegetable supply system should be aiming for in terms of public health. However, because it did not stipulate process it meant that a range of stakeholders, for example small and large-scale, within the food system could relate to it and bring their contribution on how best to achieve the desired vision. This clear focus on vision, but flexibility on how to get there, was shared with Peas Please in that the aim was increasing vegetable consumption in line with public health recommendations

[33] An earlier iteration of this list, without the term ‘a new food diplomacy’ was presented to the strategy board (this includes the project board).

without a stipulation as to how that should be done; it did not prescribe process. This provided a platform where everyone had a place and helped to facilitate the range of pledges achieved by Peas Please.

Empathy and inclusivity

Using empathy was integral to understanding where different stakeholders within the food system were coming from and what constraints they were working within. This was deployed continuously in the development of relationships across the food system. The inclusivity of the food system approach depends on facilitators being able to empathise with others. It helps if stakeholders are also encouraged to empathise with other stakeholders within the system. This was the case within development of the Fruit and Vegetable Alliance where small and large-scale producers made an effort to understand each other's points of view.

Navigating power dynamics

Being aware of perceived differences in power between different stakeholders and trying to create a level playing field were important aspects of diplomacy. Facilitating in a way that a diversity of stakeholders in different positions could contribute equally was key. An example of this was the initial marginalisation of small-scale producers from a potential Defra Edible Horticulture Roundtable and the circumventing of this by suggesting that a newly formed SME Horticulture group become the basis for the roundtable and inviting the large-scale producers instead.

Humility – listening and admitting you don't have all the answers

The project board genuinely listened to people to find out how they thought vegetable consumption could be increased. Peas Please came from a position of humility and recognition that it did not have all the answers. This humility greatly facilitated initial workshops, the co-production of the commitments framework and the resultant 'landing' of pledges.

Being social

Being social facilitated building relationships across the food system. It was an important part of the process. There were many one-to-one meetings, group meetings and events. The events, such as the Vegetable Summits, particularly

involved deploying social skills to build relationships and trust. Using social contacts and networks of relationships helped facilitate the Peas Please approach.

Pragmatism

Being pragmatic was a key feature of the work of the project board. For instance, the example of the Peas Please Vegetable Retreat which nearly resulted in a walk-out and involved the pragmatic decision to remove a large section on sustainable production methods from the draft of 'Veg Facts' in order not to disengage a number of stakeholders. There was a continual search for available levers and then given limited resources it was necessary to choose battles carefully. The commitments framework was an example of a list of pragmatic action areas.

Using a range of research approaches communicated simply and well

The presentation of the food system approach diagram and fruit and vegetable requirement were examples of research being communicated simply in order to engage stakeholders. 'Veg Facts' was the beginning of Peas Pleases use of research communicated simply and well and was based on a similar approach being deployed by the Food Foundation, for example in 'Force Fed' (Food Foundation, 2016). As well as presenting research, research was also being continually reflected upon and integrated into practice if applicable, for example, total portions pledged being compared to the fruit and vegetable requirement (in portions), to ascertain potential impact. Practitioners also had to continually use different kinds of research approaches, both qualitative and quantitative and having this breadth of skills was useful.

The art of the possible and power of the positive

The fruit and vegetable requirement and visioning (it would only take 2% to produce 5 a day in Wales) was an example of the 'power of the positive'. This put the problem in clear terms with a positive spin. People far more likely to be attracted to being involved in something when it is positive and seems possible rather than negative and impossible. Peas Please practitioners were looking for what was possible and positive; for example with the Veg Power campaign beginning with a poster competition and then going on to become a major marketing campaign.

Persistence and the ability to adapt and change

It became clear that linking production and consumption in Wales limited what could be achieved. The researcher therefore went on to engage at a UK level with a group of stakeholders which came to develop Peas Please. This persistence and ability to change track are key. The Peas Please project board was persistent in trying to drive change toward increased vegetable consumption and when something was not working, they changed if possible. For example, much time was spent trying to get the BBC to engage in developing a policy on positive messaging for vegetables but this came to nothing. However, the Veg Power campaign eventually led to ITV donating advertising space for positive messaging around vegetables.

Being a reflective practitioner

Schön (1983) describes how professionals think in action as reflective practitioners. The Iterative approach adopted as part of the PAR approach for this thesis was consistent with the approach being adopted by Food Foundation, Food Cardiff and Peas Please, in that there is a constant iterative cycle of research, action and reflection. It was not by accident that the researcher was able to engage with Peas Please; it was a result of compatible techniques and practices that made it possible.

8.5 Recommendations for food diplomacy practice

It is widely acknowledged that the modern food system is complicated and that making it deliver better food outcomes as well as other aspects of sustainability is not straightforward. As the ‘Global Panel on Agriculture and Food Systems for Nutrition’ (Haddad *et al.*, 2016, p.21) suggests, change “will require focused, determined and sustained action from policy makers working in partnership with the private sector in complex and rapidly changing environments.” This thesis agrees with this but finds that there are other stakeholders in addition to policy makers and private sector; principally third sector, who are increasingly playing a mediating role and deploying a new kind of food diplomacy in order to facilitate change. To some extent it seems obvious that bringing people together across the ‘divides’ and on complicated issues will entail some form of diplomacy. Governments have diplomats to negotiate with other governments on complex issues; it is not a new finding that difficult situations require diplomatic strategies. In relation to system transformation, Vize (2016, p.12)

talks about system leadership and suggests that, given the complexity of the modern food system, collaborative skills are now essential. In their study of 'Strategies for Intervention: an approach to youth and community work in an area of social deprivation', Williamson and Weatherspoon (1985, p.27) note that "the formation of an inter-agency group is a diplomatic task, and its maintenance demands constant sensitivity and diplomacy". This finding of over 30 years ago is similar, in a way, to the finding of this thesis.

What perhaps is a new finding, though, is making it explicit that diplomacy plays a key part in negotiating food system change, a reflection on the complexity of the divides within the food system and trying to push a neoliberalised system to deliver healthier and more sustainable outcomes. This thesis argues that stakeholders who successfully use food diplomacy are integral to achieving food system change. Without drivers of change, change is potentially either not initiated, or gets interrupted or stalled. Though there is informal recognition that there are stakeholders who are achieving great things for food system change, there has perhaps not been enough reflection on practice to understand that the mechanism of this new food diplomacy is integral to change; and as such it should be formally recognised. There is a need for food diplomats, utilising the skills outlined in this section, to be formally recognised as necessary to driving change in the food system; and for them to be supported and funded as such.

There is also a need for academic institutions that look at food security and sustainability to be teaching food diplomacy. Reed *et al.* (2017, p.27) have argued that "the challenge of developing efficient, socially acceptable and sustainable food systems that meet the demands of a growing global population can only be tackled through an interdisciplinary systems approach that integrates social, economic and environmental dimensions." They outline a new training course for students called "Innovative Food Systems Teaching and Learning (IFSTAL)" which is facilitating interdisciplinary food systems thinking. It has been trialled by a consortium of higher education institutes including, among others, the University of Oxford; City, University of London; the University of Reading, and the University of Warwick. This thesis provides elaboration of what multidisciplinary food system work entails and provides new insights. It is important to train people in interdisciplinary food systems thinking;

but part of this should be training in food diplomacy as a mechanism which may deliver change.

8.6 Summary

This thesis problematised divergence and explored convergence and whether it can offer solutions to more secure and sustainable food systems. It found that convergence has potential, and through Peas Please and the fruit and vegetable requirement stakeholders from different paradigms have come together in a new 'space of possibility'. This 'space of possibility' is experimenting with the possibilities for positive change in a 'not quite neoliberal' context and finds that in order to facilitate these spaces a new type of food diplomacy is being deployed. It is as yet unclear as to whether this food systems, convergent approach can improve food system outcomes. More time and evaluation are needed to provide greater understanding. In the meantime, it is likely that having more people at work with an understanding of the practice of food diplomacy would be facilitative and it is recommended that food diplomacy is recognised, supported and taught[34].

It may be that divergent paths can join to form a new third path and that this has benefits. To go back to the introduction, and the two Oxford farming conferences at either end of the same street, this thesis has explored the potential of a meeting in the middle and found that there are possibilities for positive change but that it takes a new food diplomacy to facilitate. The final verse to Frost's (1920) poem 'The Road Not Taken' could potentially be re-written with an alternative title that might read 'Two Roads Converge', and the last verse might read:

> I would be telling this with a sigh
> Somewhere ages and ages hence:
> But my two roads converged, and I –
> I joined others travelling by,
> And that has made all the difference.

[34] A summary of all the recommendations made in this thesis can be found in Appendix 13.

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10 Appendices

10.1 Appendix 1: Semi-structured interview guide

1. Researcher introduction and the background for PhD research. If applicable, ask for permission to record interview. Reassurance of anonymity.
2. Could you tell me a bit more about you/your organisation/and your involvement in/interest in the fruit and vegetable sector?
3. Outline of PhD research, presentation of food system approach and preliminary data on fruit and vegetable requirement and land availability in Wales.
4. What do you think of this approach? Do you think it could be a useful tool to facilitate change?
5. How do you think this could be achieved? Who should be growing it? How do you see what you do fitting in with what others do?
6. How much of our fruit and vegetable requirement do you think should be grown in Wales? 7. What do you consider are the barriers to fruit and vegetable production and what might the facilitators be?
8. What do you consider are the barriers and potential facilitators of fruit and vegetable consumption?
9. Any other issues?

10.2 Appendix 2: Interview stakeholders

Aspect of food system	Organisations	Number of interview stakeholders
Fruit and vegetable producers and distributor (total interviewees 9)	Riverside Market Garden, Cardiff	2
	Glebelands Market Garden, Pembrokeshire	1
	Brooksgrove Growers, Pembrokeshire	1
	Cultivate, Newtown	1
	Brit Growers, Bridgend	1
	The Green Valleys, Brecon	1
	Lammas, Pembrokeshire	1
	Puffin Produce, Pembrokeshire	1
Food distribution (public) (total interviewees 2)	Community Food Co-ops Wales	1
	National Procurement Service (NPS)	1
Representative bodies, (total interviewees 16) & other support/advice providers to food producers & supply chain	Wales Young Farmers Club (YFC)	1
	The Farmers' Union of Wales (FUW)	1
	National Farmers Union Cymru (NFU Cymru)	2
	NFU	1
	The Country Land and Business Association (CLA)	2
	Federation of City Farms and Community Gardens ('City Farms') Wales and the Community Land Advisory Service, Wales	3
	The National Vegetable Society (NVS)	1
	Grow Cardiff	1
	Organic Centre Wales (OCW)	1
	Horticulture Wales	2
	Pembrokeshire Local Action Network for Enterprise and Development (PLANED)	1
Food/ Growing Education/ Training/ R&D (total interviewees 2)	Farming and Countryside Education (FACE)	1
	Growing the Future (The National Botanic Gardens of Wales)	1
Governance/ Public health, statutory (total interviewees 6)	Welsh Government	3
	Ex-Assembly Minister	1
	Current Welsh Assembly Member	1
	Public Health Wales	1
NGOs supporting sustainable food environment development, (total interviewees 4)	Food Cardiff	1
	Food Foundation	2
	Nourish Scotland	1
	TOTAL	39

10.3 Appendix 3: Workshop stakeholders

Event	Organisations	Aspect of food system	Stake holders	'New' stake holders
1. Food values event workshop, Cardiff	Levercliffe Associates Public Interest Research Centre Severn Wye Energy Agency Ymlaen Ceredigion Slow Food South East Wales Riverside Country Market Association Edible Mach (Machynlleth) Welsh Government Food Cardiff	Food education/ training/R&D x2 Representative bodies/support & advice x3 Producer/distrib utor x2 Food governance x1 NGO supporting sustainable food environment x1	9	7
2. Wales Food Manifesto	Working with meaning FACE Bangor University, Geography Aberystwyth University, Law Food Sustainability Researcher	NGO supporting sustainable food environment x1 Food education/ training/ R&D x4	5	4
3. Initial RDP funding bid meeting for horticulture (Tyfu Cymru)	LANTRA x2 Miller Research Growing the Future FACE PLANED Horticulture Wales x2 OCW 'City Farms' Community Food Co-ops Wales Springfields Fresh Produce	Food education/ training/R&D x5 Representative bodies/support & advice x5 Producer/distrib utor x2	12	5
Sustainable Food Cardiff workshop	Cardiff University 'City Farms' Grow Cardiff CLAS Puffin Produce Riverside Market Garden Food Cardiff Cardiff Council	Food education/ training/R&D x2 Representative bodies/support & advice x3 Producer/distrib utor x2 NGO supporting sustainable food environment x1	9	4

		Food governance x1		
CSA Workshop Carmarthenshire	Banc CSA	Producer/distributer x3	3	3
CSA Network workshop, Carmarthenshire	CSAs from across Wales	Producer/distributer x20	20	15
Community Land Advisory Service 'Fill the Streets' event – workshop, Conwy	Cae Ffynnon x1 Incredible Edible Conwy x6 Bwyd Bendigedig x1 Growing Ruabon x2 Bro Ffestiniog Allotments x1 Conwy Allotments x1 Flintshare CSA x2 Farming Connect x1 Jenny's Garden School x1 Community Land Advisory Service Cymru x2 'City Farms' x1	Producer/distributer x14 Food/education/training/R&D x2 Representative bodies/support & advice x3	19	17
Growing our Growers event, Pembrokeshire, presentation and discussion	20 Pembrokeshire farmers/fruit and vegetable growers	Producer/distributer x20	20	20
Calon Cymru meeting	Agriculture Researcher & Writer Landscape Architect Train Development Officer Cwm Harry Land Trust	NGO supporting sustainable food environment x4	4	4
PLAID Cymru Greens Fringe event, presentation and discussion	Plaid Cymru members & an Assembly Member Robert Owen Community Banking Fund renewable energy Traws Link Cymru Wales Food Manifesto	Food governance x17 NGO supporting sustainable food environment x3	20	19

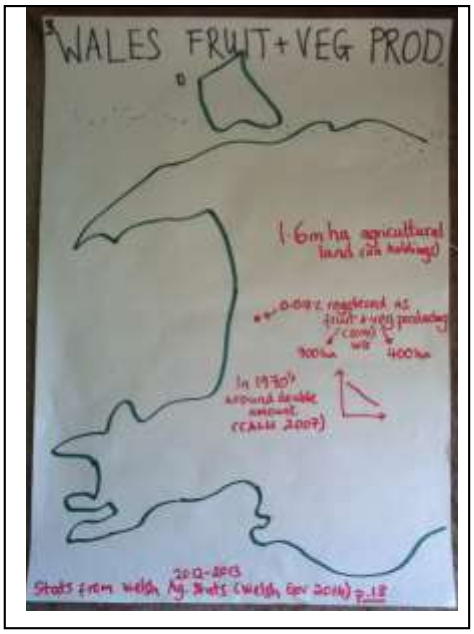
Future Generations Growers, Cardiff	Range of producers 'City Farms' Community Land Advisory Service One Planet Council Welsh Government Farming Connect Food Cardiff WWF	Producer/distributer x30 Representative bodies/support & advice x3 Food governance x1 Food education/ training/R&D x1 NGO supporting sustainable food environment x2	36	20
UK Vegetable Retreat	NFU Sustainable Restaurant Association Brassica Growers Association WRAP LEAF (Linking Environment and Farming) Food Foundation (3) Nourish Scotland Food Cardiff WWF Jamie Oliver Food Foundation Tesco LEON Restaurants Sodexo (Catering Services) Eat Balanced William Jackson Food Group Mash Direct Reynolds (Fruit and Veg Supplier) Fruit Farms Manager DEFRA Public health Consultant Public health nutritionist Public health Birmingham The London Produce Show Food writer and broadcaster Changing Markets	Representative bodies/support & advice x3 NGO supporting sustainable food environment x9 Food distribution private x5 Producer/distributor x3 Food governance x4 Fruit and vegetable marketing x3	27	20
		TOTAL	184	139

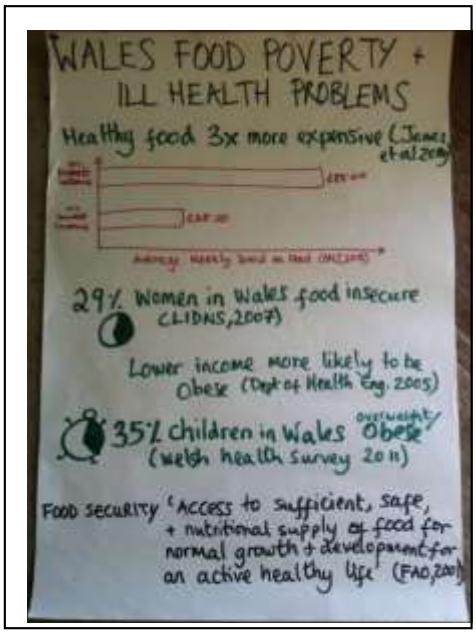
10.4 Appendix 4: Workshop stakeholder groupings

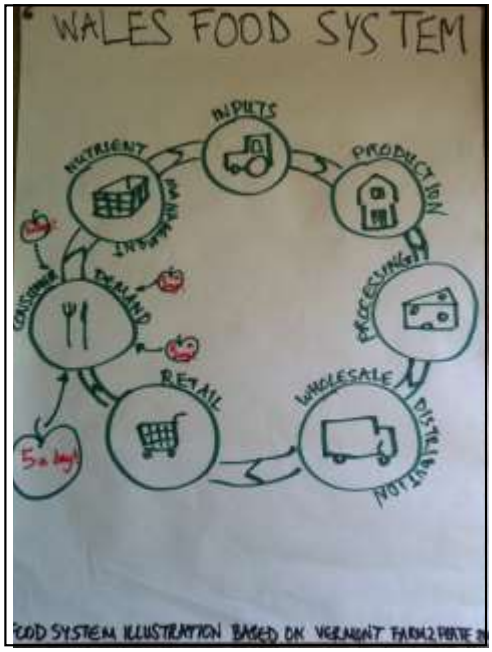
Workshops - stakeholder groupings		Number
	Fruit and vegetable producer & distributor	74
	Fruit and vegetable distribution only (public)	0

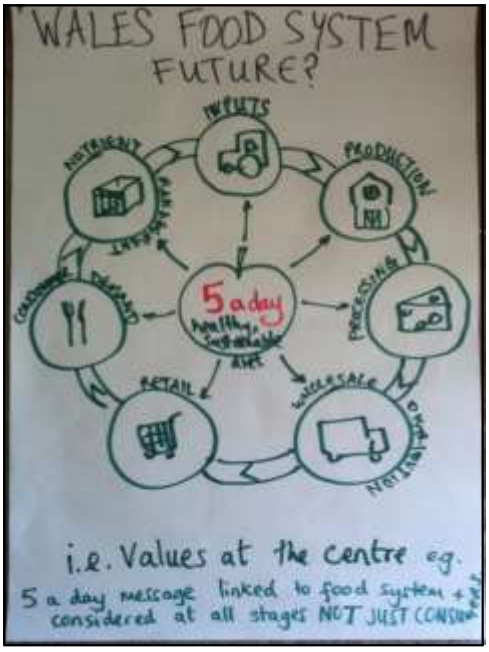
Fruit and vegetable producer/distributor/ support organisations	Fruit and vegetable distribution only (private)	5
	Representative bodies and other support/ advice providers to food producers and supply chain	9
	TOTAL	88
Other support	Food education/training/Research and Development (R&D)	13
	Food governance/public health/statutory	23
	NGOs supporting sustainable food environment development	12
	Food marketing/communications	3
	TOTAL	51
	OVERALL TOTAL	139

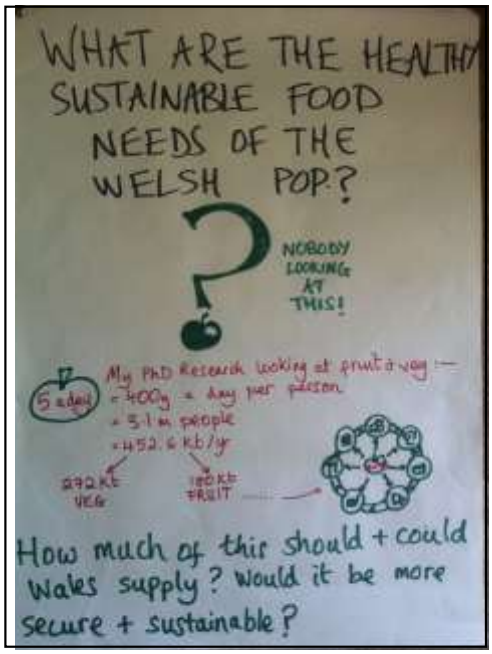
10.5 Appendix 5: First iteration of research presentation.











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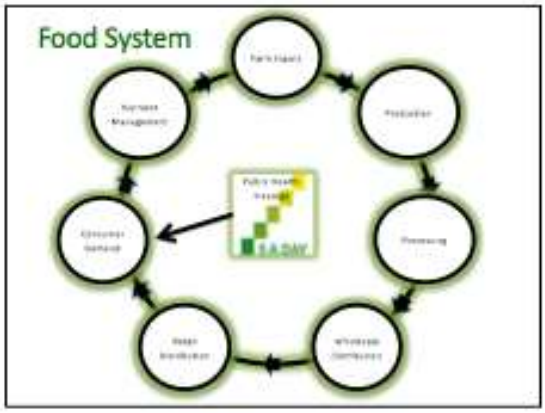
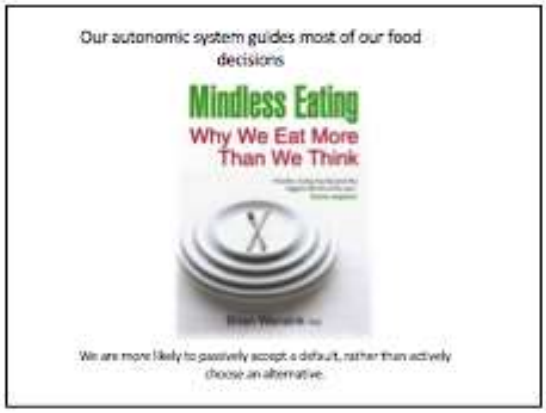
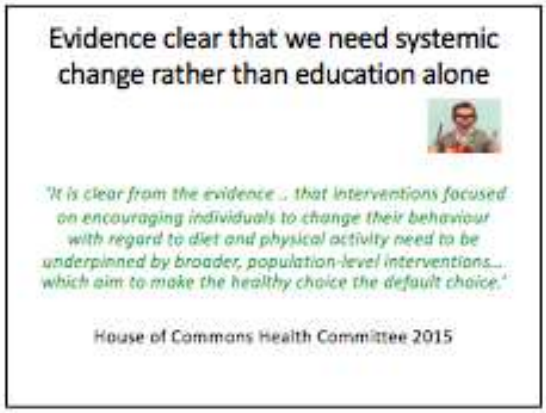
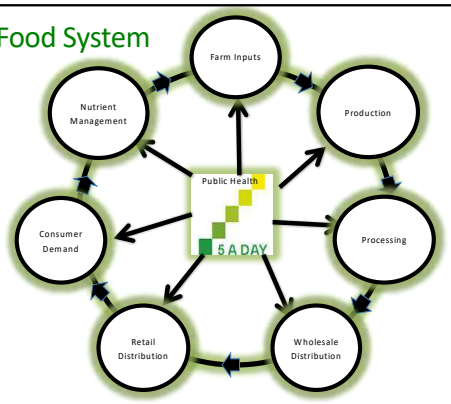
10.6 Appendix 6: Last iteration of research presentation.







Food System



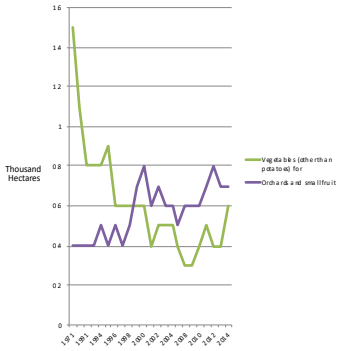
Planning for public health nutrition
Wales fruit and vegetable production

Only 1,599 ha out of 1,842,878 ha of agricultural land produces fruit and vegetables= 0.1% of land

Welsh Government Agriculture Statistics 2015

Enough to supply an Estimated 5 % of requirement (5 a day).

Wales' Fruit and Vegetable Production (hectares) 1971-2014
(adapted from Welsh Agricultural Statistics (2015) and Frost et al (2007)



How much fruit and veg needs to be in the system for the population to be healthy?

Wales' fruit and veg requirement based on 5 a day (400g) per person

Wales Annual Fruit & Vegetable 5 a day Requirement= 425,387 Tonnes

	0-1yrs	1-7yrs	8-10yrs	11+yrs	Total Population
Wales population 2015,	33,542	251,719	104,287	2,709,538	3,099,086
Fruit and vegetable requirement '5 a day' tpa	0	0.0730	0.1095	0.1460	
Fruit and vegetable requirement tpa (pre waste)	0	18,375	11,419	395,592	425,387 tonnes per year

What needs to be eaten

Plus waste

What needs to be produced to enable requirement to be met after 35% waste

654,442 Tonnes

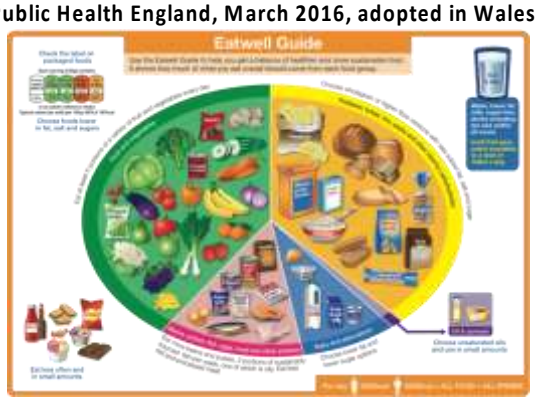
How much of this could be produced in Wales?

Land Needed to Meet Fruit and Vegetable Requirement in Wales at 18t/ha

Percentage of fruit and vegetable requirement	Tonnes Needed for Wales fruit and vegetable requirement including 35% waste	Area of land required at 18t/ha	Percentage of total Agricultural Land available 1,811,669 (Welsh Government, 2015b)	Percentage Grade 1-3 land 345,839 (Plassman and Edwards-Jones, 2007)
100%	654,442	36,358	2.0%	10.5%
90%	588,998	32,722	1.8%	9.5%
80%	523,554	29,086	1.6%	8.4%
70%	458,109	25,451	1.4%	7.4%
60%	392,665	21,815	1.2%	6.3%
50%	327,221	18,179	1.0%	5.3%
40%	261,777	14,543	0.8%	4.2%
30%	196,333	10,907	0.6%	3.2%
20%	130,888	7,272	0.4%	2.1%
10%	65,444	3,636	0.2%	1.1%
5%	32,722	1,818	0.1%	0.5%
3%	19,633	1,091	0.1%	0.3%
	Horticulture area 2014 (Welsh Government, 2015b)	1,694		

2% of land to grow 5 a day in Wales or 10.5% of Grade 1-3 land.

Public Health England, March 2016, adopted in Wales

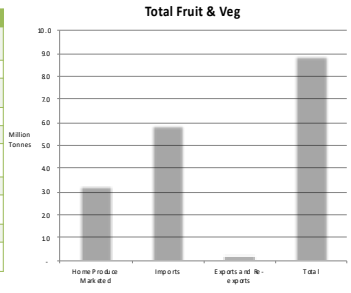


Evidence of benefits of increasing production in line with dietary guidelines

- If farming patterns shifted to meet demands for healthy diets net margin from agriculture in England & Wales would increase by 143% (Arnoult et al, 2010)
- Eating an extra portion of veg, as part of shifting to a healthier diet and eating less meat, might reduce the UKs green house gas emissions by 17% (Green *et al.*, 2015)

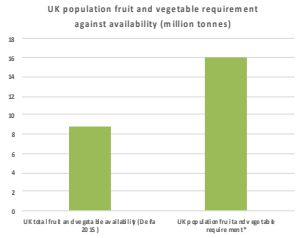
How much fruit and vegetables are available in the UK? (DEFRA 2015)

		Tonnes
Veg	Home Produce Marketed	2,798,000
	Imports	2,180,000
	Exports and Re-exports	119,000
	TOTAL	4,858,000
Fruit	Home Produce Marketed	434,000
	Imports	3,610,000
	Exports and Re-exports	103,000
	TOTAL	3,941,000
Fresh Fruit and Veg	TOTAL AVAILABLE	8,799,000



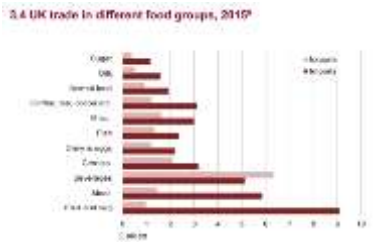
How does UK fruit and vegetable availability compare to requirement?

Total availability, production & imports, minus exports & re-exports is only 8.8 million tonnes (Defra 2015). UK population requirement for fruit and veg using new Eatwell Guide is 16 million tonnes (including 20% waste)* There is only 55% of the fruit and veg available to meet public health recommendations.



*This work was co-produced with Food Foundation (2016) where we used a more modest waste level of 20% in line with Sustainable Development Goal to halve waste. Calculation based on new eatwell guide (7 a day) scaled up for UK population, 8 million tonnes veg requirement doubled to include fruit 16 million tonnes.

Fruit and Vegetable Trade Deficit



(Food Statistics Pocketbook DEFRA (2015)

Increased production does not automatically lead to increased consumption

How do we increase consumption?

It is not enough to just provide evidence

Peas Please
Making a pledge for more veg

Multiple stakeholders working together to increase veg consumption by shifting the food system to make it easier for everyone to eat more veg

#PeasPlease
www.foodfoundation.org.uk/peasplease

The story so far..1. Veg Retreat

BUILDING A COMMON VISION & KEY COLLABORATORS

The story so far..2,3,4

2. Production of Veg Facts

3. Launches London, Cardiff and Glasgow 7th November 2016

4. Workshops across Britain Jan/Feb 2017

140 people from 92 organisations & businesses and more online

1. Veg In Everything
2. Veg On Show
3. Veg On The Go
4. Urban Veg
5. Veg In Everything
6. Outlook for Veg
7. Clever with Veg
8. Veg Direct

BUILDING PROJECT ENGAGEMENT & EVIDENCE BASE

BUILDING BUY IN

DEVELOPING POLICY BRIEFINGS AND COMMITMENTS FRAMEWORK

PEAS PLEASE COMMITMENTS FRAMEWORK

1. SHOPPING AND EATING AT HOME

1.1 Retailers review the way they sell vegetables, adopting new measures, from all menu/bf options including advertising, store siting, promotions and new product development, to increase consumption while maintaining their existing commitments to reduce waste.

1.2 Wholesalers support convenience stores to improve their offer of vegetables, through - developing a common portal for communication hub to allow retailers and their customers to know the availability and price of vegetables in a city/local area- increasing the proportion of vegetables included in offers devised by wholesalers, either those targeted at retailers, or at consumers

1.3 Retailers and brands increase the volume of veg in ready meals (whole meal replacements) and in recipes for meal ingredients

2. EATING OUT

2.1 Quick service and casual dining restaurants commit to increase the number of portions of veg they sell while maintaining commitments to reduce waste

2.2 Public procurement bodies, their umbrella organisations and major contract caterers sign off by 2020 Veg pledge "I/we commit to the principle that at least two vegetable choices must accompany each main meal at no extra charge

2.3 Cities commit to become Veg Pioneer Cities with city wide initiatives on skills, planning and procurement to drive up veg access and consumption

3. CHILDREN

3.1 Broadcasters commit to give veg a good image in kids TV through developing guidelines for programme producers

3.2 School and nursery standards are strengthened to be in line with the Eatwell Guide, made mandatory and monitored

3.3 Quick service and casual dining restaurants commit to offer two portions of veg inclusive in every kids meal

3.4 Department of Health, devolved governments and Local Authorities and other key stakeholders to commit to modernise Healthy Start to increase uptake to 90% through more effective implementation and pilot/expansion of the scheme

4. PRODUCTION

4.1 Government(s) and producer bodies support a new Sector Deal for horticulture to support producers to increase the volume of British-grown veg

4.2 Select committees (England and Wales) commit to an Inquiry into horticulture

Peas Please Wales

Welsh Government Pavilion, Royal Welsh Showground. 11-12.30, Tuesday 25th July 2017

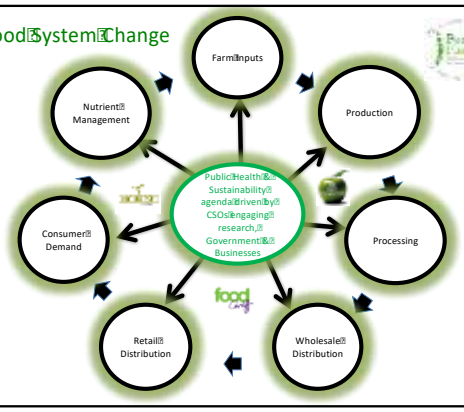
Veg Summit Wales (running alongside Summits In London City Hall and Scotland)

The Pierhead, Senedd, Cardiff, 12-3pm, Tuesday 24th October 2017

What to do in Wales

1. Grow more fruit and veg. Support horticultural development. Support plans for inquiry into horticulture & new horticulture action plan with clear vision and targets in line with health and other wellbeing outcomes.
2. Support collaborative working across the food system to increase availability of fruit and veg to enable increased consumption.

Food System Change



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Land in Wales

Table 33. Agricultural land classification (ALC): areas of grades in Wales. Grade 1: excellent, Grade 2: very good, Grade 3: good to moderate, Grade 4: poor, Grade 5: very poor. Source: Land and Water Service Technical Notes TN/RP/01 TFS 846 (February 1983)

Grade	% of agricultural land	% of total land	ha
Grade 1	0.2	0.2	4,142
Grade 2	2.3	1.9	39,347
Grade 3	17.5	14.6	302,350
Grade 4	44.2	36.8	762,087
Grade 5	35.8	29.8	617,125
Non agricultural		4.2	86,977
Urban		12.5	258,861
Total	100	100	2,070,888

From Plassman and Edwards-Jones 2007, p. 82

345,839 ha Grade 1-3 land suitable for growing fruit and vegetables but also possible on grades 4-5 though less commercially viable many small scale organic producers are making a living on this type of land

Amber Wheeler

10.7 Appendix 7: Yield summaries.

Fruit/ vegetable	Horticulture Wales crop calculator http://www.horticulturewales.co.uk/Library/Crop-Calculator.aspx	Organic Farm Management Handbook (Lampkin, Measures and Padel, 2014)	John Nix Farm Management handbook (Nix, 2014)	ADAS, personal communication
	Yield t/ha	Yield t/ha	Yield t/ha	Yield t/ha
Apples	15	11.9	35	
Cooking apples			37.5	
Pears		8	22.5	
Artichoke				10
Asparagus	3			2
Baby leaf salad	9.6			
Beetroot		25		25
Blackcurrant			6.5	8
Blueberry				6
Broad bean				4.5
Brussel sprout				17.5
Calabrese		5		5.5
Carrots		25		30
Courgettes		10		12
Dwarf beans				6.5
Fennel				5
Fresh herbs	6.7			
Polytunnel Fresh herbs	8			
Gooseberry				8
Kale	8			
Leeks	20	12		15
Onions		25	41	25
Parsnips		18		20
Peas				4

Raspberries	8		11.5	8
Rhubarb	30			25
Runner bean				12
Red cabbage		25		
Savoy				30
Strawberry	20	7.3	28.25	10
Summer cabbage		25		30
Spinach				10
Spring cabbage				15
Swedes		25		20
White cabbage		35		35.1
SUM	128.3	257.2	182.25	399.1
AVERAGE	12.83	18.37	26.04	14.78
		Average of averages		18 t/ha

10.8 Appendix 8: National Assembly for Wales: Record of Proceedings.

24/05/2017 (National Assembly for Wales, 2017b)

13:35 David Melding - What is the Welsh Government doing to address the fruit and vegetable deficit in Wales? OAQ(5)0150(ERA)

13:35 Lesley Griffiths -Thank you. The Welsh Government supports the agriculture and food industries in partnership with Amaeth Cymru and the Food and Drink Wales Industry Board. There is potential to develop horticulture and opportunity as Wales adapts to Brexit. We recognise the health benefits of fruit and vegetable consumption and have taken action to promote them.

13:36 David Melding - Thank you for that, Cabinet Secretary, and welcome back, incidentally. This is my first opportunity to say that to you.

We only produce about 10 per cent of what we consume, so the deficit is up to 90 per cent, certainly of fruit and veg that can be grown in our climate. With 2 per cent of Welsh agricultural land given over to fruit and veg, albeit 10.5 per cent of Grade 1 to 3 land, we would actually produce all that we need. So, I do hope that, in any shaping of future policy post Brexit, that we see the importance of this area. We did use to produce more; we should produce more again.

13:36 Lesley Griffiths - Yes, I think you raise a very important point and, when we look at Brexit, it's not all doom and gloom—there are opportunities. I think one of the opportunities is that we could perhaps look at the potential different uses of land, if you like, and we've started scoping that work. Obviously, it's up to a landowner what they want to do with their land, but I think there is the opportunity to do that. As I say, we're scoping it now because we'll need that information to see what we can do.

Obviously, the climate does have an impact and also consumers' choice and consumers demand vegetables out of season, if you like. So, I think all these decisions and information have to be looked at, but I think certainly, post Brexit, there is that opportunity to do that.

13:37 Jenny Rathbone - I hope we're not going to wait until Brexit before doing something about this because there are lots of things that the Government could be doing now. One is that we could be planting more fruit trees because we need to plant more trees generally and, if we have fruit trees, then their produce is available. But, more strategically, I wondered if we could have a much more urgent approach to our public procurement policy around food, in particular to enable us to follow the lead of Flintshire, which is adopting the 'Food for Life' certification, which requires schools to produce 75 per cent of their dishes freshly produced. That would obviously stimulate the horticulture industry to provide the vegetables and fruit that schools would need. The same would apply to hospitals and other public buildings. We have this approach here in our canteen in the Senedd. Surely, we can extend it to all our children.

13:38 Lesley Griffiths - Yes, we certainly don't have to wait until post Brexit—that was where I was specifically talking about the work that we were doing in looking at the use of land in a different way. Certainly, we have been looking at the current procurement regime to make sure that we do that.

I have the Food and Drink Wales Industry Board and, obviously the food and drink industry action plan, and I think that absolutely recognises the importance of healthy eating, particularly in our schools and in other parts of our public sector. We've also got the Peas Please initiative, which was started by the Food Foundation, and that's bringing together farmers and retailers and fast-food outlets, and caterers and processors and Governments, and that really is looking at the supply chain and how we can raise fruit and vegetable production.

10.9 Appendix 9: Peas Please commitments framework.

COMMITMENTS FRAMEWORK

SHOPPING AND EATING AT HOME

1. Retailers commit to re-evaluate the way they sell vegetables, adopting new measures* to drive increased consumption while maintaining their existing commitments to reduce waste
2. Retailers and manufacturers commit to increase the volume of veg in ready meals (whole-meal replacements) and in on-pack and online recipes for meal ingredients (e.g. cook-in sauces etc.)

EATING OUT

3. Quick service, Food-On-The-Go businesses and casual dining restaurants commit to increase the number of portions of veg they sell while maintaining commitments to reduce waste
4. Businesses and public sector bodies providing food commit to support people to eat two portions of veg at lunchtime at no extra charge
5. Manufacturers' recipes for food service customers commit to follow standards which include at least two portions of veg in all main meals

TOWNS AND CITIES

6. Town and cities commit to become urban veg pioneers, with city wide initiatives on skills, planning and/or procurement, campaigns and initiatives to drive up veg access & consumption and reduce waste

CHILDREN

7. Broadcasters commit to give veg a good image in kids TV through developing guidelines for programme producers
8. Department for Education and devolved governments ensure school and nursery food standards are strengthened to be in line with the Eatwell Guide, made mandatory and monitored
9. Quick service and casual dining restaurants commit to offer two portions of veg inclusive in every kids meal
10. Department of Health, devolved governments, Local Authorities and other key stakeholders commit to modernise Healthy Start to increase uptake, and explore new ways for securing preferential access to vegetables for those on a low income

PRODUCTION

11. Government(s) and producer bodies commit to support the development of a New Sector Deal for horticulture to enable producers to increase the volume of sustainably produced British veg
12. Select committees (England and Wales) commit to an Inquiry into horticulture

* See small print

TRACKING
Peas Please and partners announce an awards scheme and annual report to monitor commitments made at the summit.

The commitments framework provides the details of what will be achieved.

10.10 Appendix 10: Peas Please pledges 2017.

	Stakeholder	Peas Please pledge summary 2017 (for links to all pledges, including some adopted in 2018 see https://foodfoundation.org.uk/veg-pledges/)
1.	Scottish Government	In Scotland, the Scottish Government has made commitments across different sectors to encourage veg consumption – for example, supporting convenience stores with their veg offer, reviewing the Healthy Start scheme, increasing the land available for community growing and reviewing the school food regulations.
2.	DEFRA	Supporting our vegetable growers and producers is of great importance. In particular, we want to support the use of sustainable horticultural practices which improve not only the environment and soil, but also quality of the vegetables produced. One way we are demonstrating our support for growers and producers is with our new online Food Marketplace website, which helps to connect ambitious food SMEs with government departments, schools and hospitals to secure public sector contracts.
3.	National Farmers' Union (NFU)	We're working hard to secure: continued access to sufficient numbers of workers to pick and pack our crops; a crop protection policy that puts us on a level playing field with the rest of the EU; the continuation and development of the Producer Organisation scheme to support investment in productivity on farm; and commitments from retailers to deliver greater fairness and transparency with their suppliers
4.	Tyfu Cymru (Lantra)	Lantra, on behalf of Tyfu Cymru, pledge to produce an Action Plan for Commercial Horticulture for Welsh Government. This will look at how we can protect but also develop and grow the horticulture industry in an innovative and sustainable way in Wales.
5.	Puffin Produce	Puffin Produce will further develop sustainable horticulture in Wales and contribute to the development of a Wales Horticulture Action Plan with Tyfu Cymru by 2020. We will increase production of vegetables in Wales by 50% by 2020.
6.	Lidl UK	We pledge to increase our range of fun sized veg to make it more appealing to children; to include one portion of veg (80g) in every ready meal or an equivalent serving suggestion on pack; to include two portions of veg in all our online recipes and to promote veg in store, online and on printed promotional materials. We will also continue with our other commitments such as putting veg alongside fruit at the front of our new stores and promoting more than six types of vegetables per month through 'pick of the week'.
7.	Sainsbury's	We pledge to increase the amount of products that contain a 'one of your five-a-day' message by at least 30, as well as including a 'one of your five-a-day' promise into new product development briefs for soups, sandwiches, salads and ready meals. We also pledge to promote the benefits of vegetables through our digital channels by: ensuring vegetables are either on the homepage or fresh produce landing pages; promising to always include at least two portions of vegetables in our 'main meals' recipes site plus provide

		positive messages about vegetables within our recipes. In our main stores, vegetables will always be positioned in higher footfall areas plus we will always include a vegetable option when we have a fresh inspirational plinth plus ensure at least one vegetable is listed on produce promotional space. We also pledge to communicate to stores that Healthy Start vouchers can be spent on vegetables plus include vegetable-based recipes when we're sharing information with media.
8.	Mars Food UK	We pledge to update our on-pack and online recipe suggestions to encourage people to add more veggies to the meals that they create and we'll be helping champion increased veg with our catering customers, using our Dolmio and Uncle Ben's products. That means we'll be looking to inspire more veg in over 450 million meals a year!
9.	Our Kitchen	We pledge to pack a portion of veg into every main meal and our risotto will be made with veg from local allotments.
10.	Simply Fresh	We pledge to make sure our side dish in evening meal deals always includes both a salad and a vegetable. We will ensure that all retail main-course recipes published across all advertising space includes at least 2 portions of veg. We will do more veg adverts and make them even more appealing, advertising veg weekly on social media and at least monthly through both print and digital channels. We will put vegetables in higher footfall parts of the store (including through chilled checkouts) and set aside more space for them. We will dedicate promotional space to at least one vegetable line per week. We also pledge to make it easier for people with Healthy Start vouchers to spend them on fruit and veg.
11.	Tesco	We pledge that when we develop our recipes and introduce new products we will aim to increase the amount of vegetables and ensure more vegetable options are included in evening meals deals. For example, our Finest evening Meal Deal will always include two vegetable side dish options. We will continue to work with our supplier partners to develop new vegetable-based products to increase the overall consumption of vegetables.
12.	Co-op	On top of our existing work to promote veg consumption, we pledge to include a weekly feature on our social media of vegetables and advertise at least one seasonal vegetable in our magazine, online and on our social media every month. We will promote Peas Please to our customers and indicate which cooking sauces include one of your five a day where possible. We will put vegetables at the top of the agenda when planning retail new product design across all our food categories and increase veg options in our lunchtime meal deals.
13.	Nestle UK	We pledge to update all of our retail Maggi dry recipe mix, stock cube and stock pot meal recommendations to include at least two portions of vegetables per serving (on-pack and online) by the end of 2018. This will encourage 3 million people who buy these Maggi products every year to eat more veg.

14.	Association of Convenience Shops	We pledge to incentivise retailers to sell more veg by sponsoring a new award at the Retail Industry Awards, Convenience Retail Awards, and HIM CTP Awards. The award will recognise and reward convenience retailers who increase sales and encourage consumption of fresh fruit and vegetables.
15.	Scottish Grocers' Federation	Scottish Grocers Federation pledges to continue to work in partnership with the Scottish government to support the ongoing development of the Healthy Living Programme. SGF will use its events, communication channels and stakeholder forums to encourage retailers to participate in the programme and to recognise the benefits of providing customers with healthy eating options, particularly fresh fruit and vegetables.
16.	Sustainable Restaurant Association	We pledge to continue encouraging members and the restaurant sector at large to increase the amount of veg they sell, through our 'More Veg and Better Meat' and 'Kids Veg Out' campaigns from 2017, and future campaigns in the coming years.
17.	Greggs	We pledge that 100% of Greggs soup and leaf-based meal salads will provide at least one portion of veg. We commit to grow the like for like volume each year between January 2018 and October 2020. Through these ranges we will sell an additional 15 million portions of veg over the period from January 2018 to October 2020. We also pledge that 50% of Greggs cold sandwiches will provide half a portion of veg. Increased use of veg and salad will be a new strategic criteria for New Product Development.
18.	PwC/BaxterStorey	We pledge to increase the overall percentage of fruit and vegetables in the meals offered via BaxterStorey restaurants in PwC's offices across the UK, from 16% to 20% by the end of 2018. We'll be testing activities such as: dedicated vegetarian and vegan options, fruit and veg mini-mart stands in offices for easier healthy snacking and Celebrate the Seasons 'hero' veg campaigns. Across the wider PwC community, we'll raise awareness of the campaign via internal channels and produce quarterly e-recipe cards, encouraging our employees to be vegetable trailblazers at home as well as work.
19.	Bidfood	We pledge to include two portions of vegetables as part of the main meals available within our canteens, in a bid to help feed the 5,000 (Bidfood employees). As well as this, we're looking to increase the amount of veg based snacks available across our business. Our Food Development team will begin to develop customer recipes that include hidden vegetables, as well as how to swap ingredients for vegetables that don't increase the cost of the meal for consumers. We also pledge to promote vegetables through our marketing channels, where possible.
20.	Sodexo	As a foodservice provider in the UK & Ireland serving around one million meals a day to people in hospitals, schools, the armed forces and prisons, we pledge to play our part to help everyone in Britain eat an extra portion of veg a day. We will support this by increasing the number of vegetables we procure by 10 per cent by 2020, creating more vegetable-focused recipes and continuing to roll out our successful pilot

		of Green & Lean – our sustainable meals range where all dishes are at least two thirds plant based.
21.	Interserve	Autograph Education (part of Interserve) pledges to ensure two portions of veg are served in 30% of schools reached through our Brighton and Hove, Bromley and Hastings contracts. In the remaining 70% of schools we will take steps to support children to eat more veg and take opportunities where we can to deliver 2 portions in every meal.
22.	Castell Howell	Castell Howell's manufacturing partner, Authentic Curries and World Foods currently produces 3 product lines that contain more than 2 portions veg (>160g). The annual sales of these product lines are expected to be in the region of 50,000 portions for 2018. They also produce 13 product lines that contain at least one portion of veg (80g).The annual sales of this product are projected to be nearly 700,000 portions for 2018. We will endeavour to increase the vegetable content by up to 20% to a minimum of 80g in a further 5 product lines during 2018 with projected sales of around 150, 000 portions. By the end of 2018 we will aim for 21 of Authentic Curries and World Foods Company's ready meal lines to contain a minimum of one portion of veg and we will endeavour to ensure that all new product development contains a minimum of 1 portion of veg where appropriate.
23.	The Healthy Food Company	We pledge that all 3000 of the main dishes we provide to parents, restaurants, schools and the NHS every day include two portions of veg by 2020 (from a current baseline of 88%).
24.	Soil Association	We pledge to ask all restaurants participating in our Out to Lunch campaign (25 of the UK's largest chains) to include two portions of veg in every children's meal and to support menu development to this end. If just half the chains on the league table achieve this it will mean 100 million children's meal options served with extra veg this year.
25.	The Plough Harborne	We will offer two portions of veg with every kids meal at no additional charge. When customers order a kids meal, we will ask them which two veg they would like, and will have till prompts to help staff remember to ask.
26.	Brains Brewery Chain	We pledge to increase the portions of veg in children's meals from one portion to two, working to implement in 30-40 of our restaurants in year one. We also commit to training our staff to enable a culture that supports veg choices and therefore promotes vegetable consumption with our customers.
27.	Birmingham City Council	We pledge to increase take up of Healthy Start vouchers from 72% to 85% (approximately 2,200 more people). We will increase the numbers of retailers who accept outlets and make that more visible. We will include a minimum of two portions of veg in every school meal for over 70,000 Birmingham school children every day and bring our 'Seed to Plate' scheme through which pupils learn to grow and cook veg to around 300 Birmingham schools. Our new Great Big Brummie Street Food Competition will support new vendors to launch if they include two portions of veg in their meals. We are developing a public sector nutrition standard in Birmingham and potential providers of food will have to

		demonstrate how they support groups and the wider population to eat more veg. We will support PhD in Health Economics based at University of Birmingham to work with retailers to increase vegetable purchases.
28.	Brighton & Hove	We pledge to become a pioneer Veg City. We will work with public and private sector caterers who serve over 1.5 million meals a month, to serve an extra portion of veg with each meal. We will run training for chefs and cooking classes for the public to make veg the star of the plate. We will promote veg eating in schools and nurseries alongside our Sugar Smart work. We will promote the uptake of Healthy Start Vouchers to help low-income families with young children buy fresh or frozen veg. We will work with developers to include spaces for food growing and access to places where residents can buy veg within new developments.
29.	Food Cardiff	Cardiff Council, Cardiff Met University, Cardiff University, Cardiff and Vale Health Board, Food Cardiff, Riverside Realfood and Penylan Pantry are all working together to make Cardiff Wales' first Veg City. The Council is working towards all Council catering supporting people to eat two portions of veg in main meals provided; in schools catering, staff canteens and external venues. Cardiff Met is pledging to increase all dishes that currently only have one portion of veg to two portions at no extra cost. The flagship hospital staff and visitor restaurant is pledging too and Food Cardiff will support the whole effort.
30.	Cardiff Council	Cardiff Council will support the city in becoming a Veg City in partnership with Food Cardiff by: Continuing to support the roll out of the School Holiday Enrichment Programme (Food and Fun) in conjunction with partners in areas of need across the city, to ensure children are receiving two portions of veg in their main meal and learning about healthy eating through food and nutrition resources and training. Working towards all Council catering supporting people to eat two portions of veg in main meals provided; in schools catering, staff canteens and external venues. And promoting the winning Veg Campaign poster for children through schools and council venues.
31.	Cardiff University	We pledge that one vegetable portion (80g) will be included in all our lunch time menus. We will offer and encourage, our customers, to eat more vegetables, by reducing the price of the second portion, to half price.
32.	Cardiff and Vale University Health Board	Cardiff and Vale UHB commit to increasing the number of portions of veg we sell in our flagship staff and visitor restaurant, Y Gegin, as part of a wider programme of work to develop healthy options and menu items to ensure a 75% – 25% split in favour of healthy options available at all Health Board catering outlets. We will monitor progress using our Audit Tool to assess compliance and volume of veg sold. We will also deliver accredited training to Catering Staff to improve their knowledge and confidence to promote healthy options with customers and display the winning Poster in GP surgeries and on hospital screens.

33.	Cardiff Metropolitan University	We pledge to increase all dishes that currently only have one portion of veg to two portions at no extra cost. Additional vegetable portions will be available and will be cheaper than chips. In addition we will advertise the Peas Please logo on all menus. This will apply to almost 600 meals served on campus each day.
34.	Sustainable Food Cities	We are thrilled to announce that following a consultation with Sustainable Food Cities members our next campaign, starting in summer 2018 will be Veg Cities. Over the coming months we will be working with the Food Foundation and other Peas Please partners to build the resources to help other cities get on board with this campaign throughout the 50 strong network of Sustainable Food Cities.
35.	Tyfu Fynu, Social Farms & Gardens, Wales	We pledge to lobby for community growing spaces in all communities in Wales that want to work together to grow vegetables. We will provide support and training to existing and emerging growing projects helping them engage more people in local food production and increase productivity. We will continue to raise the challenges and push for more support for sustainable horticulture.
36.	Riverside Real Food	As a strategic member of the Food Cardiff partnership, Riverside Real Food commits to supporting Cardiff to become a Veg City. We will do this through promotion of the Veg City campaign at all of our farmers markets – up to 180 per year, through selecting producers working with local veg, on social media, and hold/support promotional events.
37.	Penylan Pantry	Penylan Pantry will support Cardiff to become one of the first Veg Cities. We will do this by continuing to develop our innovative, personal and sustainable approach to selling veg, serving delicious veg dishes in our cafe whilst ensuring waste is kept to an absolute minimum. In addition, we will support Cardiff's bid to become a Veg city, supporting the campaign and encouraging other businesses to get involved through events, social media and particularly through a Meal Squared Roots to Leaf collaborative business supper.
38.	WRAP	We commit to helping everyone to eat more vegetables by working with businesses via our existing industry-facing programmes to encourage them to help customers throw away less vegetables and get vegetable portion sizes right. We commit to help consumers eat more vegetables and waste less by improving labelling information on fresh produce as part of developing new labelling guidance for business.We commit to help everyone eat more vegetables and waste less by improving measurement of food consumption.
39.	GroentenFruit H uis (Fresh Produce Centre), The Netherlands	The Dutch vegetable industry, united in the GroentenFruit Huis (Fresh Produce Centre) commit to focus on innovation of product and services in their business with the United Kingdom, with the aim of increasing consumption and to promote a healthy diet, for children in particular. Efforts will continue to provide more attractive, sustainable and high quality products, also in terms of packaging, labelling and marketing. Best practices for driving increased consumption in the wider society (such as

		healthcare) will be actively shared with UK partners by the Dutch National Action Plan for Fruit and Vegetables.
40.	Redbridge	We pledge to become a pioneer Veg City. We will work with public and private sector caterers who serve over 1.5 million meals a month, to serve an extra portion of veg with each meal. We will run training for chefs and cooking classes for the public to make veg the star of the plate. We will promote veg eating in schools and nurseries alongside our Sugar Smart work. We will promote the uptake of Healthy Start Vouchers to help low-income families with young children buy fresh or frozen veg. We will work with developers to include spaces for food growing and access to places where residents can buy veg within new developments.
41.	Birds Eye	Birds Eye pledges to increase TV and online advertising for vegetables by 42% to £4.8m until December 2019. The ads will be shown during children's TV programming times as well as during peak family viewing, with the nutrition message reaching social media users through Instagram, Facebook, Pinterest and Buzzfeed. Birds Eye will increase its vegetable product range, invest in consumer health messaging, and work with all major supermarkets to grow the number of veg promotions in store to attract more families into vegetables and pulses. Birds Eye will add nine new products to its vegetable range over the next 12 months including pulse and veg mixes.

10.11 Appendix 11: 'Raison d'être' for new Fruit and Vegetable Alliance.

A New Fruit and Vegetable Alliance to boost

Fruit and Vegetable production and consumption

25 billion more portions per year from UK producers

The area growing fruit and vegetables in the UK (horticulture minus non-edible plants and flowers) is only 150,000 ha (Defra, 2017a, p.16). Compared to overall total utilised agricultural area of 17,360,000 this represents just under 1% of utilised agricultural land. Seen in land terms horticulture is a small sector.

However, in terms of financial returns it is a relatively large sector. On a UK level it is a bigger income generator than pig or lamb and similar in size to poultry. In 2016 the value of vegetables was £1.3 billion and fruit £0.7 million combining to give an output of £2 billion, more than the value of pig meat (£1 billion) or Lamb meat (£1.1 billion) and similar to that of poultry (£2.2 billion) (Defra, 2017a, p.31). The sector is bigger than the ornamental horticulture sector which is valued at £1.2 billion (Defra, 2017b).

UK Government dietary advice supports eating fruit and veg to the level of '7 a day' (Public Health England, 2016). According to calculations based on the most recent data[1] , to reach 7 portions a day the population needs 15 million tonnes of fruit and vegetables to be available per year or 188 billion portions per year. Fruit and vegetable availability (home production minus export plus imports) is however only 9.3 million tonnes (Defra, 2017b) or 117 billion portions giving a 5.7 million tonne or 71 billion portions deficit.

This means that if we import the same ratio as currently (Defra, 2017b), imports will have to rise by 3.7 million tonnes and UK production to increase by 2 million tonnes (1.5 vegetables and 0.5 million tonnes fruit) for the population to fulfil the requirement. This translates to another 25 billion portions per year needed from UK producers, 18 billion portions of vegetables and 7 billion fruit.

Talking about increasing production with growers leads to discussions of barriers and possible enablers, and though these differ slightly between large and small scale producers there is much cross over. Some of the barriers are 'squaring the circle' of how to make a living from selling fruit and veg at the same time as producing an affordable product; lack of fairness in the system; training and labour issues; lack of research and development; the constraints of seasonality versus desire for exotic fruit and veg and the culture of fruit and veg consumption; lack of marketing of fruit and veg; and a 'chicken and egg' lock in situation in terms of whether to increase consumption or production first. Overlying these barriers is a lack of holistic approaches within the sector and a lack of policy direction and vision from Government which in itself has been a barrier to development.

Divergence in the horticultural sector such as between large and small scale producers, organic and non-organic, and many different crops means that it has been a fragmented and disparate sector. In an already small sector this has inhibited co-working and the benefits that come from linking up and strength in numbers. This along with a divergence between

[1] Prepared for this paper by Peas Please and the Food Foundation and using the same methodology as Farming for 5 a day (allowing for 20% waste) but with the most up to date datasets (2016) available. Food Foundation 2017. Farming for 5 a day. http://foodfoundation.org.uk/wp-content/uploads/2017/11/Farming-for-five-a-day-final.pdf.

the horticulture sector and the rest of the supply chain and between the supply chain and public health nutritionists has meant that the change desired by all these stakeholders, for consumers to buy and eat more fruit and veg, has been more difficult to achieve. Without convergence across these divides, and a clear supported vision, the fruit and vegetable sector in the UK has little chance of moving away from a chicken and egg scenario where they cannot produce more because they do not have the support and they do not have the support because they do not produce more. The net result would be a downward spiral of production where increasingly fruit and veg is imported from countries which do support and plan with their horticulture sectors.

This is why UK fruit and vegetable producers, large and small scale, along with initiatives working to drive up consumption of fruit and vegetables such as Peas Please, are coming together to form a new Fruit and Vegetable Alliance. We hope this Alliance will act as a platform to develop a clear and coherent vision and plan for the sector, one based on the health needs of the population and supported by Government.

Horticulture to date has not had the support it requires to flourish. '7 a day' translates to 40% of each person's diet consisting of fruit and vegetables (Scarborough *et al.*, 2016, Public Health England, 2016) yet currently only 1% of £3 billion of the agriculture spend is on horticulture[2]. For Government to deliver on the health goals it has set itself and to recoup the savings from a healthier population it should support the expansion of UK fruit and vegetable production and help to drive up demand. If health is a public good and the government want to use public money for public goods (Defra, 2018) then horticulture is a prime example of a sector that would be ideal to support. Expanding fruit and vegetable production would also have other social, economic and environmental benefits.

To do this the Fruit and Veg Alliance will be considering developing an action plan to increase production at the same time as delivering on environmental and other public goods. This could involve schemes for innovation, infrastructure support, training and apprenticeships, a seasonal workers scheme, collaboration, Community Supported Agriculture (CSA), demand incentives and marketing. It could be delivered through expanding current schemes and lowering the threshold for grants so that smaller scale producers could also benefit, or it could be delivered through a bespoke fruit and vegetable scheme benefitting all scales alike.

This would help the sector to produce 25 billion more portions per year to bring the UK population consumption up to levels required for health. This represents an increase in an increase in value of the sector from £2 billion to £3.1 billion. This would involve 2 million tonnes more fruit and vegetables grown in the UK and estimated 109,986 more hectares coming into production (18 t/ha yield).

To date horticulture has shown huge resilience in the face of very little external support and is a highly innovative sector that does not necessarily want subsidy but it does require support. Despite the barriers, fruit and vegetable production is highly productive per unit area with an average financial output of £13K per hectare (Defra, 2017a). There is a good chance that with investment in the right areas, the horticulture sector, with a resilient and dynamic cohort of producers, and an enthusiastic new wave of entrants, will flourish thus helping to deliver multiple public goods, especially increased consumption of fruit and

[2] Data from Farm Business Survey

vegetables.

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10.12 Appendix 12: National Assembly for Wales: Record of Proceedings.

24/10/2017 (National Assembly for Wales, 2017c)

13:51:00 Jenny Rathbone AM

40. Thank you. I've just come from the Vegetable Summit being held in the Pierhead at the same time as in London and Edinburgh, and we heard really important pledges from a wide variety of producers and promoters of, for example, children's rights. The children's commissioner highlighted the fact that nearly 80 per cent of children aged five to 10 are not eating enough vegetables, and 95 per cent of 11 to 16-year-olds are not eating enough vegetables to be able to learn and play effectively, and that this is a children's rights issue. We heard important pledges from the largest supermarket in the UK, Tesco, who have agreed to buy seasonable veg from UK growers, as well as putting more vegetables in their meal deals. Castell Howell, Brains, Cardiff University, Cardiff Metropolitan University, Cardiff and Vale University Local Health Board, Cardiff council all pledging to serve and promote more vegetables in their pubs, canteens and dining rooms. What can we do to ensure that that increased purchase of vegetables comes from Welsh producers, rather than from other UK outlets or, indeed, from abroad?

(http://record.assembly.wales/Plenary/4652#C28997)

24/10/2017 13:52:00 Carwyn Jones AM

41. Can I welcome the fact that the Vegetable Summit is taking place at the Pierhead building as we speak? It brings together farmers, retailers, processors and Government, looking at the supply chain and how we can raise vegetable production. We are committed, through the food and drink action plan, which we share with our publicly appointed industry board, to not only grow the Welsh food and drinks sector, but to do so sustainably and to tackle the deep-rooted challenges of diet. The National Procurement Service has set up buying arrangements that allow Welsh public bodies to access a wide range of vegetable products to support healthier meal planning.

(http://record.assembly.wales/Plenary/4652#C28998)

10.13 Appendix 13: Thesis Recommendations.

In relation to fruit and vegetable production and consumption:

1. Wales, other UK Governments and cities adopt the use of population fruit and vegetable requirements for policy, action planning and evaluation purposes.
2. Edible horticulture action plans be co-produced in Wales and the UK.
3. Horticulture be supported in terms of developing infrastructure, training and marketing.
4. Defra to report annually on UK population fruit and vegetable requirement as part of their horticulture statistics, comparing availability to requirement.
5. More comprehensive fruit and vegetable waste data be collected.
6. More comprehensive data be collected at a Wales level:
    a. More detailed food consumption data.
    b. Horticultural business register.
    c. Land area under cultivation by community growing projects.
    d. Data on hectarage and tonnage of fruit and vegetables produced and available.
7. Further engagement be undertaken with the Welsh fruit and vegetable supply chain.

In relation to Peas Please:

8. Broader sustainability and social issues, particularly low-income consumption, to be revisited.
9. A more systematic analysis of political, environmental, socio-economic, impacts and feedbacks of Peas Please be undertaken.
10. Greater exploration of potential regulatory or policy facilitators.
11. Theorists to consider combining political ecology, Actor Network Theory and a food system approach to provide greater insight.
12. A new food diplomacy be recognised as important, supported and taught.